

Frank H. Blair 7/14

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

BULLETIN 545

BIBLIOGRAPHY
OF
NORTH AMERICAN GEOLOGY
FOR
1912
WITH SUBJECT INDEX

BY

JOHN M. NICKLES



WASHINGTON
GOVERNMENT PRINTING OFFICE
1913

Nickles, J. M.—BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1912.—U. S. G. S. Bulletin 545

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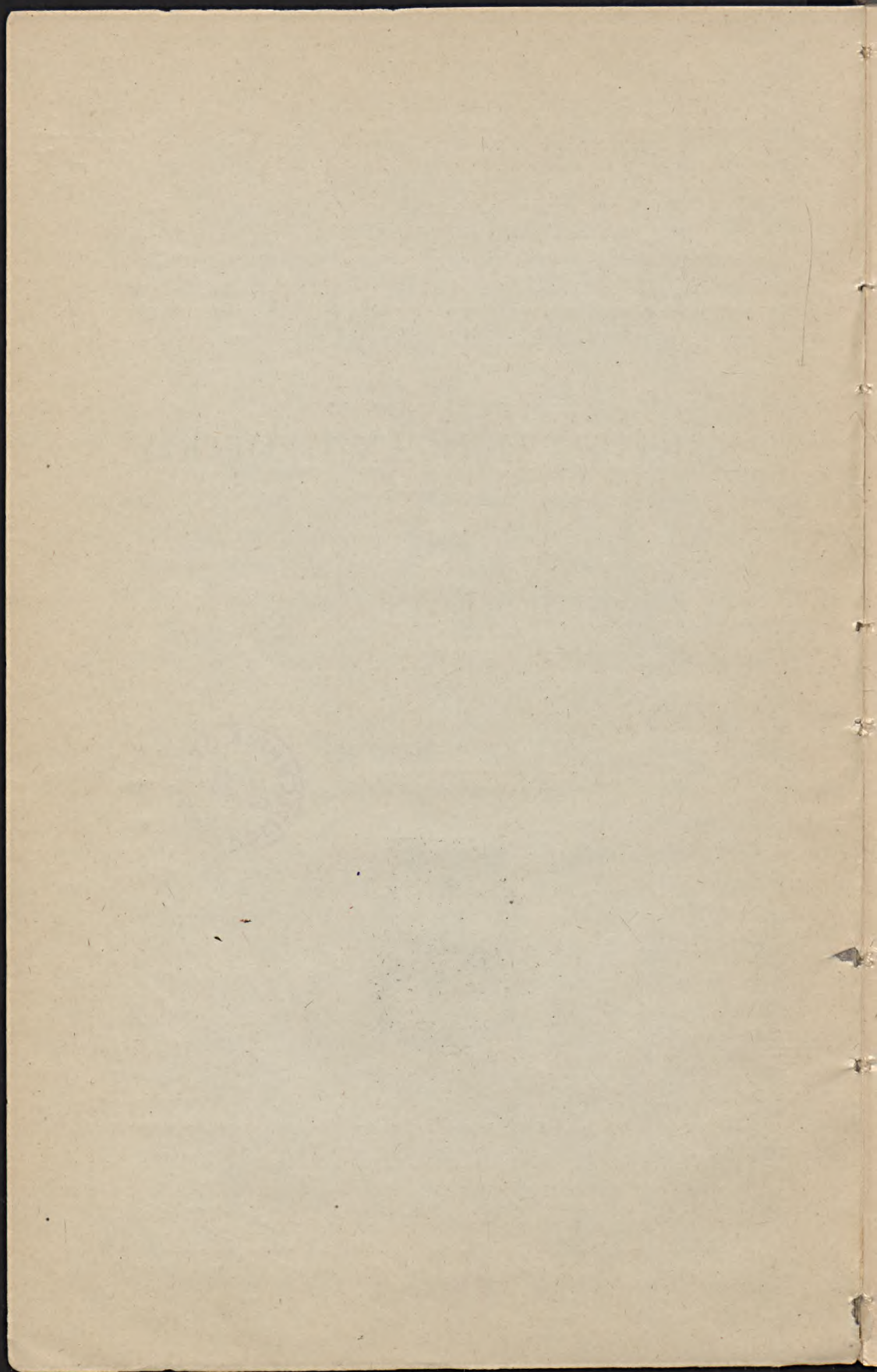
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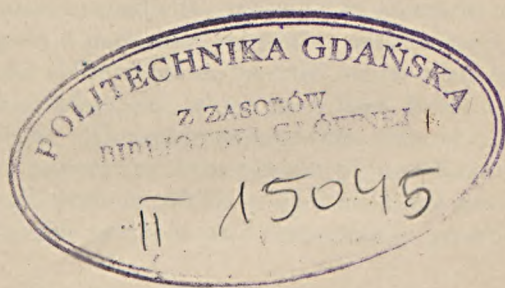






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BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY FOR 1912, WITH SUBJECT INDEX.

By JOHN M. NICKLES.



INTRODUCTION.

The bibliography of North American geology, including paleontology, petrology, and mineralogy, for the year 1912, follows the plan and arrangement of its immediate predecessors, the bibliographies for 1906-7, 1908, 1909, 1910, and 1911 (Bulletins 372, 409, 444, 495, and 524 of the U. S. Geological Survey). It includes publications bearing on the geology of the Continent of North America and adjoining islands, also Panama and the Hawaiian Islands. Papers by American writers on the geology of other parts of the world are not included. Textbooks and papers general in character by American authors are included; those by foreign authors are excluded unless they appear in American publications.

As heretofore, the papers, with full title and medium of publication and explanatory note when the title is not fully self-explanatory, are listed under the authors, arranged in alphabetic order. The author list is followed by an index to the literature listed. In this index the entries in one alphabet are of three kinds—first, subject, with various subdivisions, to enable the specialist to ascertain readily all the papers bearing on a particular subject or area; second, titles of papers, many of them abbreviated or inverted, under their leading words; and third, cross references, which have been freely used to avoid too much repetition. The subjects have been printed in black-faced type, the titles of papers and cross references in ordinary type. As it may not be always obvious which subject headings have been adopted, a classified scheme of those used immediately precedes the index.

Miss Isabel P. Evans has given efficient assistance in preparing the material for the press.

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United States Geological Survey.

1127. Mineral resources of the United States, Calendar year, 1911; part I, Metals, 1018 pp., 16 figs.; part II, Nonmetals, 1224 pp., 9 pls., 14 figs., 1912.

Contains the following papers, mainly statistical in character, relating to the production, condition of the industry, etc., but also in some cases including notes on the geology and occurrence of the products treated:

PART I.

Mineral products of the United States: Review of conditions and output in 1910 and 1911, by Edward W. Parker, pp. 7-90.

Summary of mineral production in the United States in 1911, compiled by W. T. Thom, pp. 91-112.

Metals and metallic ores in 1910 and 1911, by H. D. McCaskey, pp. 113-118.

Iron ore, pig iron, and steel, by Ernest F. Burchard, pp. 119-174.

Iron-ore reserves of Michigan, by C. K. Leith, pp. 175-190.

Manganese and manganiferous ores, by Ernest F. Burchard, pp. 191-208.

Gold and silver, by H. D. McCaskey, pp. 211-254.

Copper, by B. S. Butler, pp. 255-313.

Lead, by C. E. Siebenthal, pp. 315-351.

Zinc, by C. E. Siebenthal, pp. 353-395.

Cadmium, by C. E. Siebenthal, pp. 399-401.

Gold, silver, copper, lead, and zinc in the Western States (mine production):

Introduction, by H. D. McCaskey, pp. 403-406.

Alaska, by A. H. Brooks, pp. 406-420.

Arizona, by V. C. Heikes, pp. 420-462.

California, by Charles G. Yale, pp. 462-505.

Colorado, by Charles W. Henderson, pp. 505-569.

Idaho, by C. N. Gerry, pp. 570-602.

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Nevada, by V. C. Heikes, pp. 646-702.

New Mexico, by Charles W. Henderson, pp. 702-721.

Oregon, by Charles G. Yale, pp. 721-733.

South Dakota, by Charles W. Henderson, pp. 734-738.

Texas, by Charles W. Henderson, pp. 739-740.

Utah, by V. C. Heikes, pp. 740-777.

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Silver, copper, lead, and zinc in Central States (mine production), by J. P. Dunlop and B. S. Butler, pp. 793-872.

Gold, silver, copper, lead, and zinc in the Eastern States (mine production), by H. D. McCaskey, pp. 873-888.

Quicksilver, by H. D. McCaskey, pp. 889-921.

Bauxite and aluminum, by W. G. Phalen, pp. 923-939.

Tungsten, vanadium, uranium, titanium, molybdenum, nickel, cobalt, tantalum, tin, antimony, bismuth, and selenium, by Frank L. Hess, pp. 941-977.

Chromic iron ore, by W. C. Phalen, pp. 979-986.

Platinum and allied metals, by Waldemar Lindgren, pp. 987-1003.

PART II.

FUELS.

Coal: coke, by E. W. Parker, pp. 5-267.

Fuel briquetting, by E. W. Parker, pp. 269-278.

Natural gas, by D. T. Day and B. Hill, pp. 279-333.

Petroleum, by D. T. Day, pp. 335-480.

Peat, by C. A. Davis, pp. 481-484.

United States Geological Survey—Continued.

1127. Mineral resources of the United States, etc.—Continued.

STRUCTURAL MATERIALS.

- Cement industry in the United States in 1911, by E. F. Burchard, pp. 485-519, 1 pl. (map).
 Clay-working industries, by Jefferson Middleton, pp. 521-584.
 Glass sand, other sand, and gravel, by E. F. Burchard, pp. 585-638.
 Gypsum, by E. F. Burchard, pp. 639-644.
 Lime, by E. F. Burchard, pp. 645-718.
 Sand-lime brick, pp. 719-721.
 Slate, by A. T. Coons, pp. 723-739.
 Stone, by E. F. Burchard, 741-833, 7 pls. (maps).

ABRASIVE MATERIALS.

- Abrasive materials, by W. C. Phalen, pp. 835-854.

CHEMICAL MATERIALS.

- Arsenic, by F. L. Hess, pp. 855-856.
 Borax, by H. S. Gale, pp. 857-866, 1 pl. (map).
 Fluorspar and cryolite, by E. F. Burchard, pp. 867-875.
 Phosphate rock, by F. B. Van Horn, pp. 877-888.
 Potash salts, by W. C. Phalen, pp. 889-917.
 Salt and bromine, by W. C. Phalen, pp. 919-936.
 Sulphur, pyrite, and sulphuric acid, by W. C. Phalen, pp. 937-957.
 Manufacture of sulphuric acid at Ducktown, Tenn., by F. B. Laney, pp. 958-964.
 Barytes and strontium; mineral paints, by W. C. Phalen, pp. 965-993.

MISCELLANEOUS.

- Asbestos, by J. S. Diller, pp. 995-1001.
 Asphalt, related bitumens, and bituminous rock, by D. T. Day, pp. 1003-1021.
 Feldspar and quartz, by Jefferson Middleton, pp. 1023-1030.
 Fuller's earth, by Jefferson Middleton, pp. 1031-1035.
 Gems and precious stones, by D. B. Sterrett, pp. 1037-1078.
 Graphite, by E. S. Bastin, pp. 1079-1112.
 Magnesite, by H. S. Gale, pp. 1113-1127.
 Mica, by D. B. Sterrett, pp. 1129-1135.
 Mineral waters, by G. C. Matson, pp. 1137-1174.
 Concentration of mineral water in relation to therapeutic activity, by R. B. Dole, pp. 1175-1192.
 Monazite and zircon, by D. B. Sterrett, pp. 1193-1196.
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 1128. Miscellaneous analyses of coal samples from various fields of the United States: U. S. Geol. Survey, Bull. 471, pp. 629-655, 1912.
 1129. Contributions to economic geology (short papers and preliminary reports), 1910; Part II, Mineral fuels: U. S. Geol. Survey, Bull. 471, 663 pp., 62 pls., 15 figs., 1912.

The papers in this bulletin have been entered under the individual authors.

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1130. Geology of the country around Julianehaab, Greenland: Meddelelser om Grønland, H. 38, pp. 1-376, 18 pls., 32 figs., 1912; (Reprint) Copenhagen, Univ., Mus. Mineral. and Geol., Comm. géol., no. 2, 368 pp., 18 pls., 32 figs., 1911.



Ussing, N. V.—Continued.

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Includes an account of the geologic formations in the vicinity of Montreal, Canada.

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1. GENERAL.

Associations, meetings; Addresses; History; Philosophy; Biography; Bibliography; Educational; Text-books.

Classification; Nomenclature; Cartography; Technique; Fieldwork; Surveys; Borings.

Geochemistry; Chemical analyses (list); Atmosphere; Radioactivity.

Experimental investigations; Miscellaneous.

2. REGIONAL.

The States of the Union, Alabama, etc.; the Provinces of Canada. Alberta, etc.; Greenland; Mexico; the countries of Central America; the West Indies, and the single islands; the Hawaiian Islands.

3. ECONOMIC.

Ore deposits, origin; Contact phenomena.

Gold; Placers; Black sands; Silver; Quicksilver; Nickel; Cobalt; Copper; Lead; Zinc; Iron; Magnetite; Manganese; Tin; Aluminum; Bauxite; Antimony; Bismuth; Tungsten; Wolframite; Vanadium; Uranium; Carnotite ores; Molybdenum; Molybdenite; Titanium; Rutile; Platinum; Iridium; Rhodium; Palladium; Cadmium; Monazite; Rare earths; Tantalum; Selenium; Tellurium; Zircon.

Coal; Anthracite; Coke; Peat; Lignite; Bituminous rock; Natural gas; Petroleum; Oil shales; Asphalt; Albertite; Gilsonite; Grahamite; Ozokerite.

Stone; Building stone; Granite; Bluestone; Limestone; Lime; Marble; Onyx; Sandstone; Clay; Kaolin; Bentonite; Fire clay; Ganister; Slate; Shale; Marl; Sand; Glass sand; Sand-lime brick; Gravel; Cement and cement materials; Concrete materials; Road materials; Trap; Steatite; Soapstone; Talc; Serpentine.

Precious stones; Diamonds; Sapphires; Turquoise; Tourmaline.

Abrasive materials; Corundum; Emery; Garnet; Diatomaceous earth; Tripoli; Volcanic ash; Millstones; Novaculite.

Asbestos; Feldspar; Mica; Quartz; Gypsum; Graphite; Fuller's earth; Infusorial earth; Magnesite; Mineral paint; Chromium; Chromite; Chromic iron ore; Fluorspar; Barite; Barytes; Strontium; Arsenic; Pyrite; Sulphur; Sulphate of soda; Cryolite; Phosphorus; Phosphate; Apatite; Potash; Alunite; Glaucanite; Borax; Bromine; Salt; Natron deposits.

4. DYNAMIC AND STRUCTURAL.

Earth, genesis of; Earth, age of; Earth, interior of; Earth, temperature of.

Volcanism; Volcanoes; Earthquakes; Seismology; Seismographs; Mud volcanoes.

Isostasy; Orogeny; Changes of level.
Magmas; Intrusions; Dikes; Laccoliths; Metamorphism; Contact phenomena.
Deformation; Folding; Faulting; Unconformities.
Conglomerates; Concretions; Stalactites; Jointing; Cleavage.
Sedimentation; Denudation; Erosion; Caves; Sink holes; Erratic boulders;
Weathering; Wind work; Dunes; Loess; Landslides.
Glaciers; Glacial erosion; Eskers; Kames; Moraines; Kettle holes.
Drainage changes.

5. PHYSIOGRAPHIC.

Geomorphy; Relief maps.
Valleys; Cirques; Deserts; Dunes; Deltas; Alluvial fans; Eskers; Kames;
Mounds, natural; Natural bridges; Sink holes; Karsts.
Lakes; Swamps; Marshes; Everglades; Terraces; Beaches; Shore lines;
Rivers; Meanders; Falls; Springs.

6. HISTORIC OR STRATIGRAPHIC.

Geologic history; Geologic time; Paleogeography; Paleogeographic maps;
Paleoclimatology.
Geologic maps; Geologic formations described (list).
Pre-Cambrian; Paleozoic (undifferentiated); Cambrian; Ordovician; Silurian; Devonian; Carboniferous; Triassic; Jurassic; Cretaceous; Tertiary;
Quaternary; Recent; Glacial geology; Glaciation; Glacial lakes; Ice ages.

7. PALEONTOLOGY.

Geographic distribution; Evolution; Restorations.
Vertebrata; Man, fossil; Mammalia; Aves; Reptilia; Amphibia; Pisces; Footprints, fossil.
Invertebrata; Arthropoda; Crustacea; Trilobita; Ostracoda; Insecta; Arachnida; Myriapoda.
Mollusca; Cephalopoda; Gastropoda; Pelecypoda.
Molluscoidea; Brachiopoda; Bryozoa; Vermes.
Echinodermata; Echinoidea; Asteroidea; Crinoidea; Crystoidea.
Cœlenterata; Anthozoa; Hydrozoa; Graptolites.
Protozoa; Spongiida; Foraminifera.
Paleobotany; Diatoms.
Problematica.

8. PETROLOGY.

Rocks, origin; Rocks, structural features; Rocks described (list); Igneous and volcanic rocks; Rock-forming minerals; Lava; Oolite; Pebbles.

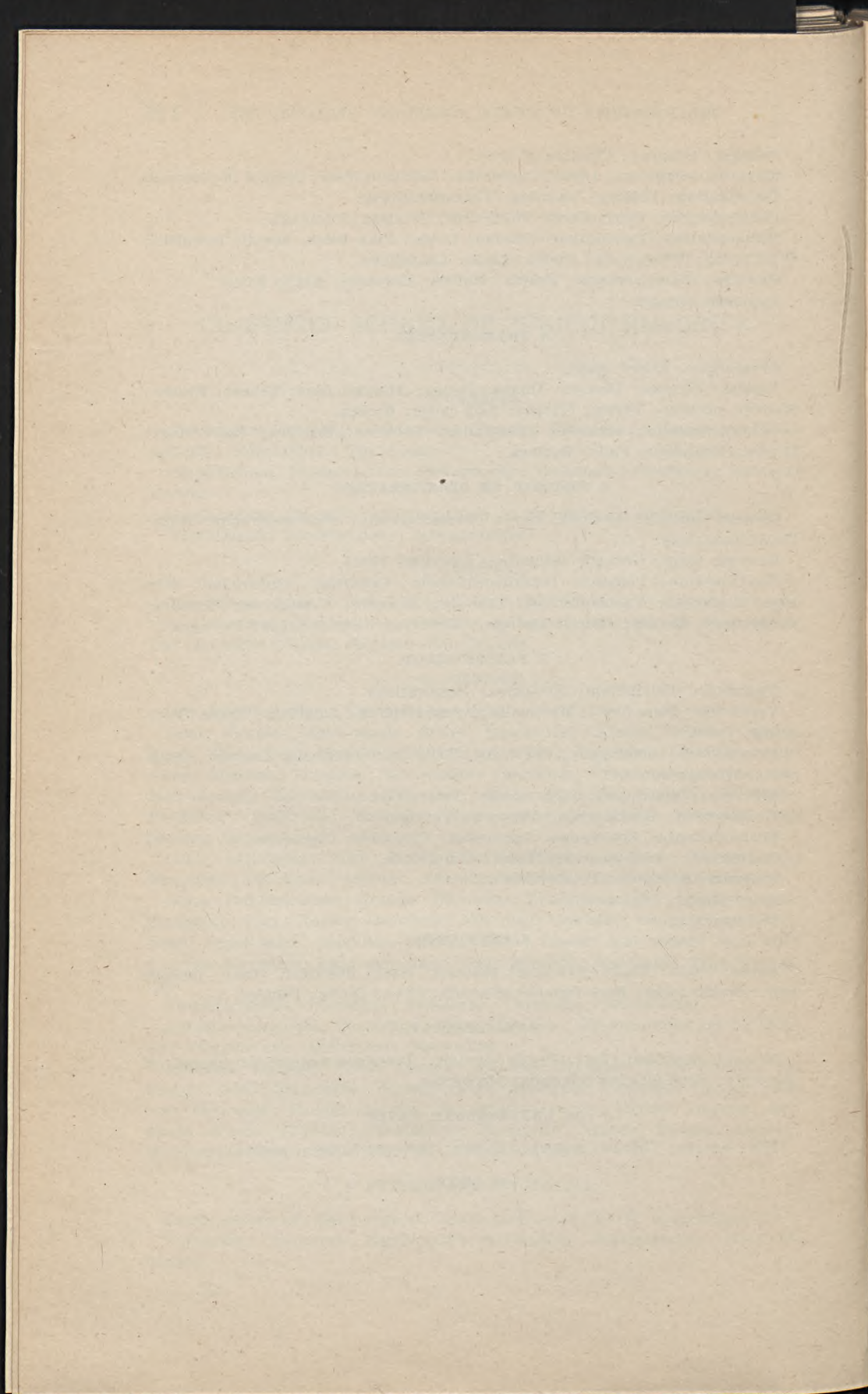
9. MINERALOGY.

Minerals described (list); Crystallography; Pseudomorphism; Paragenesis of minerals; Rock-forming minerals; Meteorites.

10. UNDERGROUND WATER.

Mine waters; Thermal waters; Geysers; Springs; Mineral waters.

11. SOILS.



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- Becraft limestone, Devonian, New York: Hartnagel, 432; Kindle, 581.
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- Buena Vista member, Devonian, Ohio: Prosser, 872.
- Buffalo sandstone, Carboniferous, West Virginia: Hennen, 447.
- Buffalo sandstone member, Pennsylvanian, Ohio, West Virginia, Kentucky: Phalen, 850.
- Bulkley eruptives, Tertiary?, British Columbia: Malloch, 715.
- Burden conglomerate, Ordovician, New York: Hartnagel, 432.
- Burgen sandstone, Ordovician, Oklahoma: Snider, 1005.
- Burgess shale, Cambrian, British Columbia: Walcott, 1152.
- Burgoon sandstone member, Mississippian, Pennsylvania: Munn, 782.
- Burke formation, pre-Cambrian, Idaho: Hershey, 452.
- Burlington formation, Mississippian, Missouri: Crane, 233.
- Burlington limestone, Mississippian, Illinois: Lines, 670; Udden, 1117.
- Burlington terrane, Carboniferous, Iowa: Keyes, 577.
- Burton sandstone, Carboniferous, West Virginia: Hennen, 447.
- Bushberg sandstone, Devonian, Missouri: Crane, 233.
- Buxton formation, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Byer sandstone, Mississippian, Ohio: Hyde, 528.
- Cache Creek formation, Carboniferous, British Columbia: Camsell, 162.
- Calciferous formation, Ordovician, Quebec: Valiquette, 1132.
- Caledonia group, pre-Carboniferous, New Brunswick: Young, 1259.
- Calvert formation, Miocene, Maryland: Miller, 758.
- Calvert formation, Miocene, Virginia: Clark and Miller, 192.
- Cambric or Taconic system: Hartnagel, 432.
- Cambridge (lower) limestone, Pennsylvanian, Ohio, West Virginia, Kentucky: Phalen, 850.
- Camillus shale, Silurian, New York: Hartnagel, 432.
- Canadian group, Ordovician: Hartnagel, 432.
- Canajoharie shale, Ordovician, New York: Hartnagel, 432.
- Cap Mountain formation, Cambrian, Texas: Paige, 817.
- Capote quartzite, Cambrian, Mexico: Lee, 645.
- Carbondale formation, Carbondale, Illinois: Shaw, 970.
- Carbondale formation, Pennsylvanian, Illinois: Lines, 670; Shaw and Savage, 972.
- Carbonic system: Hartnagel, 432.
- Cardiff shale, Devonian, New York: Hartnagel, 432.
- Carlile shale, Upper Cretaceous, Colorado: Stose, 1056.
- Carlville limestone, Pennsylvanian, Illinois: Lines, 670.
- Carmack basalts, Tertiary or Pleistocene, Yukon: Cairnes, 149.
- Carmanah formation, Oligocene-Miocene, British Columbia: Clapp and Allan, 185.
- Carmanah formation, Tertiary, British Columbia (Vancouver Island): Clapp, 182.
- Carmichaels formation, Quaternary, Pennsylvania: Munn, 782.
- Caseyville formation, Pennsylvanian, Kentucky: Glenn, 373.
- Cashaqua shale, Devonian, New York: Hartnagel, 432.
- Cassin formation, Ordovician, New York: Hartnagel, 432.
- Cassville plant shale, Carboniferous, West Virginia: Hennen, 447.
- Cassville shale member, Permian, Pennsylvania: Munn, 782.
- Castle Hayne limestone, Eocene, North Carolina: Clark *et al.*, 193.
- Castle Rock conglomerate, Oligocene, Colorado: Richardson, 908.
- Cataldo formation, pre-Cambrian, Idaho: Hershey, 452.
- Cataldo formation, pre-Cambrian, Idaho: Huston, 527.
- Cathedral formation, Cambrian, British Columbia: Allan, 9.
- Cat Hill granite, pre-Cambrian, New York: Hartnagel, 432.
- Catskill beds, Devonian, New York: Hartnagel, 432.
- Catskill formation, Devonian, New York and Pennsylvania: Barrell, 48.
- Catskill (?) formation, Devonian, Pennsylvania: Munn, 782.
- Catskill formation, Devonian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Cattaraugus beds, Mississippian, New York: Hartnagel, 432.
- Cayuga group, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Cayuga group, Silurian, New York: Hartnagel, 432.
- Cayuta shale, Devonian, New York: Hartnagel, 432.
- Cedar district formation, Cretaceous, British Columbia: Clapp, 183.
- Cedar Valley limestone, Devonian, Iowa: Norton *et al.*, 800.
- Cenozoic series: Hartnagel, 432.
- Centerville limestone, Devonian, New York: Hartnagel, 432.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Central (Mine) group, Cambrian, Michigan: Lane, 627.
- Chadron beds, Tertiary, South Dakota: Perlisho and Visser, 843.
- Chagrin formation, Devonian, Ohio: Prosser, 872; Ulrich, 1122.
- Chagrin shale, Ohio: Cushing, 246.
- Chagrin shale, Devonian, Ohio: Kindle, 581.
- Champlainic or Ordovician system: Hartnagel, 432.
- Chancellor formation, Cambrian, British Columbia: Allan, 9; Walcott, 1146.
- Channahon limestone, Silurian, Illinois: Savage, 935.
- Chardon sandstone, Mississippian, Ohio: Prosser, 872.
- Chattanooga black shale, Devonian, Georgia: Maynard, 738.
- Chattanooga shale, Devonian, Kentucky: Kindle, 582.
- Chattanooga shale, Devonian, Oklahoma: Snider, 1005.
- Chattanooga series: Ulrich, 1122.
- Chautauquan group, Devonian, New York: Hartnagel, 432.
- Chazy, Ordovician, Vermont: Perkins, 845.
- Chazy beds, Ordovician, New York: Hartnagel, 432.
- Chazy formation, Ordovician, Ontario: Raymond, 888.
- Chazy limestone, Ordovician, Quebec: Valiquette, 1132.
- Chazy, Ordovician, Pennsylvania: Ziegler, 1262.
- Chehalis formation, Miocene, Washington: Weaver, 1169.
- Chemung beds, Devonian, New York: Hartnagel, 432.
- Chemung formation, Devonian, New York and Pennsylvania: Barrell, 48.
- Chemung (?) formation, Devonian, Pennsylvania: Munn, 782.
- Chemung group, Mississippian, Missouri: Crane, 233.
- Chequamegon sandstone, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Cherokee formation, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Cherokee formation, Pennsylvanian, Missouri: Crane, 233.
- Cherokee shale, Pennsylvanian, Missouri: Hinds, 470.
- Cherokee terrane, Carboniferous, Iowa: Keyes, 577.
- Cherry Valley limestone, Devonian, New York: Hartnagel, 432.
- Chesapeake group, Miocene, Maryland: Miller, 758.
- Chesapeake group, Miocene, Virginia: Clark and Miller, 192.
- Chester (Huron) formation, Mississippian, Indiana: Cumings, 244.
- Chester group, Mississippian, Missouri: Crane, 233.
- Chickaloon formation, Tertiary, Alaska: Martin and Katz, 722.
- Chickamauga, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Chickamauga formation, Ordovician, Georgia: Maynard, 738.
- Chico formation, Cretaceous, California: Dumble, 293.
- Chieftain Hill volcanics, Cretaceous, Yukon: Cairnes, 149.
- Chinech formation, California: Hershey, 452.
- Chinitna shale, Jurassic, Alaska: Martin and Katz, 721.
- Chisli conglomerate, Jurassic, Alaska: Martin and Katz, 721.
- Choptank formation, Miocene, Maryland: Clark and Miller, 192; Miller, 758.
- Chouteau limestone, Carboniferous, Iowa, Missouri: Keyes, 578.
- Chouteau limestone, Mississippian, Missouri: Crane, 233.
- Chouteau terrane, Carboniferous, Iowa: Keyes, 577.
- Chowan formation, Pleistocene, North Carolina: Clark *et al.*, 193.
- Chugwater formation, Triassic, Wyoming: Jamison, 539.
- Cincinnati shale, Ordovician, Illinois: Udden, 1117.
- Cincinnati group, Ordovician: Hartnagel, 432.
- Cincinnatus flags, Devonian, New York: Hartnagel, 432.
- Cinnemousun limestone, pre-Cambrian, British Columbia: Daly, 254.
- Cisco formation, Texas: Udden and Phillips, 1121.
- Claggan terrane, Devonian, Iowa: Keyes, 577.
- Claggett formation, Cretaceous, Montana: Pepperberg, 842.
- Clarksburg fire-clay shale, Carboniferous, West Virginia: Hennen, 447.
- Clarksburg limestone, Carboniferous, West Virginia: Hennen, 447.
- Clarksburg red shale, Carboniferous, West Virginia: Hennen, 447.
- Clarksburg division, Ordovician, Ohio and Kentucky: Foerste, 327.
- Claysville limestone member, Permian, Pennsylvania: Munn, 782.
- Clear Creek chert, Devonian, Illinois: Lines, 670.
- Clear Creek (Oriskany) formation, Devonian, Missouri: Crane, 233.
- Clermont terrane, Ordovician, Iowa: Keyes, 577.
- Cleveland shale, Ohio: Cushing, 246.
- Cleveland shale, Devonian, Ohio: Kindle, 581; Prosser, 872.
- Cleveland shale, Waverlyan, Ohio: Ulrich, 1122.
- Clinch formation, Silurian, Tennessee: Gordon and Jarvis, 383.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Clinton beds, Silurian, New York: Hartnagel, 432.
- Clinton limestone, Silurian, Illinois: Lines, 670.
- Clinton limestone, Silurian, Ohio: Fuller and Clapp, 346.
- Clinton shale, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Cloche Island beds, Ordovician, Ontario: Foerste, 329.
- Coast Range intrusives, Jurassic, Yukon: Cairnes, 149.
- Cobalt series, pre-Cambrian, Ontario: Burrows, 137.
- Cobalt series, pre-Cambrian, Quebec: Wilson, 1221.
- Cobalt series, upper Huronian, Ontario: McMillan, 709.
- Cobleskill limestone, Silurian, New York: Hartnagel, 432.
- Coboconk limestone, Ordovician, Ontario: Johnston, 557.
- Coeymans limestone, Devonian, New York: Hartnagel, 432; Kindle, 581.
- Coffeyville formation, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Cohansey formation, Quaternary, New York: Hartnagel, 432.
- Coharie formation, Pleistocene, North Carolina: Clark *et al.*, 193.
- Colesburg terrane, Silurian, Iowa: Keyes, 577.
- Colgate sandstone member, Cretaceous or Tertiary, Montana: Beekly, 63.
- Colgate sandstone member, Tertiary, Montana: Calvert, 157.
- Collingwood formation, Ordovician, Ontario: Foerste, 329; Raymond, 888.
- Colorado shale, Cretaceous, Montana: Calvert, 158, 159; Pepperberg, 842.
- Columbia group, Pleistocene, North Carolina: Clark *et al.*, 193.
- Columbia group, Pleistocene, Virginia: Clark and Miller, 192.
- Columbus limestone, Devonian, Ohio: Stauffer, 1025.
- Comanche series, Cretaceous, Texas: Paige, 817.
- Comanche Peak limestone, Cretaceous, Texas: Paige, 817.
- Comox formation, British Columbia: Clapp, 184.
- Conasauga, Cambrian, Tennessee: Gordon and Jarvis, 383. *See also* Conasauga.
- Conemaugh formation, Pennsylvanian, Ohio, West Virginia, Kentucky: Phalen, 850.
- Conemaugh formation, Pennsylvanian, Pennsylvania: Munn, 782.
- Conemaugh series, Carboniferous, West Virginia: Hennen, 447.
- Conasauga shales and limestones, Cambrian, Georgia: Maynard, 738.
- Connellsville sandstone, Carboniferous, West Virginia: Hennen, 447.
- Connelly conglomerate, Devonian, New York: Hartnagel, 432.
- Conococheague limestone, Cambrian, West Virginia: Stose and Swartz, 1058.
- Conway mica schist, Vermont: Hitchcock, 473.
- Coplay limestone, Ordovician, Pennsylvania: Miller, 757; Peck, 839.
- Coralville terrane, Devonian, Iowa: Keyes, 577.
- Corbin conglomerate, Carboniferous, Kentucky: Miller, 756.
- Cornishville member, Ordovician, Kentucky: Foerste, 327.
- Cornwall shale, Devonian, New York: Hartnagel, 432.
- Corry sandstone, Mississippian, Ohio: Prosser, 872.
- Cortlandt series, pre-Cambrian, New York: Hartnagel, 432.
- Coutchiching series, pre-Cambrian, Ontario: Lawson, 636, 637.
- Cowichan group, Cretaceous, British Columbia (Vancouver Island): Clapp, 182.
- Cowichan group, Upper Cretaceous (?), British Columbia: Clapp and Allan, 185.
- Cowlitz formation, Eocene, Washington: Weaver, 1169.
- Cranberry formation, Cretaceous, British Columbia: Clapp, 183.
- Creston formation, Cambrian, British Columbia: Clapp, 183.
- Creston formation, Cambrian, British Columbia: Schofield, 953.
- Creston red shale, Carboniferous, West Virginia: Hennen, 447.
- Cretacic group: Hartnagel, 432.
- Crill terrane, Cretaceous, Iowa: Keyes, 577.
- Crown Point limestone, Ordovician, New York: Hartnagel, 432.
- Crowsnest volcanics, Cretaceous, Alberta: Leach, 643.
- Cuba sandstone, Devonian, New York: Hartnagel, 432.
- Cumberland Head shale, Ordovician, New York: Hartnagel, 432.
- Curlew limestone, Carboniferous, Kentucky: Glenn, 371.
- Curlew sandstone, Carboniferous, Kentucky: Glenn, 371.
- Cussewago shales and sandstone, Mississippian, Ohio: Prosser, 872.
- Cuyahoga formation, Carboniferous, Ohio: Prosser, 871.
- Cuyahoga formation, Mississippian, Ohio: Hyde, 528; Stauffer, 1025.
- Cuyahoga shale, Mississippian, Ohio: Prosser, 872.
- Cypress formation, Mississippian, Missouri: Crane, 233.
- Cypress sandstone, Carboniferous, Illinois: Shaw, 970.
- Cypress sandstone, Mississippian, Illinois: Lines, 670.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Dakota(?), Cretaceous, Alberta: Leach, 643.
- Dakota formation, Cretaceous, Manitoba: Ries and Keele, 916.
- Dakota sandstone, Cretaceous, Colorado: Lee, 647, 648.
- Dakota sandstone, Cretaceous, Kansas: Parker, 826.
- Dakota (?) sandstone, Cretaceous, Utah: Lupton, 689.
- Dakota sandstone, Cretaceous, Wyoming: Jamison, 539.
- Dakota sandstone, Cretaceous, Wyoming-South Dakota: Stone, 1045.
- Dakota (?) sandstone, Cretaceous, Wyoming: Wegemann, 1178.
- Dakota sandstone, Upper Cretaceous, Colorado: Stone, 1056.
- Davis formation, Cambrian, Missouri: Crane, 233.
- Dawson arkose, Eocene, Colorado: Richardson, 908.
- Day Point limestone, Ordovician, New York: Hartnagel, 432.
- Deadwood formation, Cambrian, Wyoming: Jamison, 539.
- Decewsville formation, Ontario: Stauffer, 1024.
- Decker Ferry limestone, Silurian, New York: Hartnagel, 432.
- Decorah shale, Ordovician, Iowa: Norton *et al.*, 800.
- Decorah terrane, Ordovician, Iowa: Keyes, 577.
- DeCourcy formation, Cretaceous, British Columbia: Clapp, 183.
- Deepkill shale, Ordovician, New York: Hartnagel, 432.
- DeKoven formation, Pennsylvanian, Kentucky: Glenn, 373.
- Delaware limestone, Devonian, Ohio: Stauffer, 1025.
- Derby formation, Cambrian, Missouri: Crane, 233.
- Des Moines group, Pennsylvanian, Iowa: Norton *et al.*, 800.
- Des Moines group, Pennsylvanian, Missouri: Crane, 233; Hinds, 470.
- Devils Island sandstone, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Devonic system: Hartnagel, 432.
- Dewey limestone, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Diamond Peak formation, Nevada: Hershey, 452.
- Dixon formation, Pennsylvanian, Kentucky: Glenn, 373.
- Dixon sandstone, Carboniferous, Kentucky: Glenn, 371.
- Dodge terrane, Cretaceous, Iowa; Keyes, 577.
- Doe Run formation, Cambrian, Missouri: Crane, 233.
- Dolgeville shale, Ordovician, New York: Hartnagel, 432.
- Dolores shale, Triassic, Utah: Woodruff, 1243.
- Donley limestone member, Permian, Pennsylvania: Munn, 782.
- Douglas shale, Pennsylvanian, Missouri: Hinds, 470.
- Doyle shale, Permian, Oklahoma: Ohern and Garrett, 803.
- Dresbach sandstone, Cambrian, Iowa: Norton *et al.*, 800.
- Dresbach terrane, Cambrian, Iowa: Keyes, 577.
- Dunkard series, Carboniferous, West Virginia: Hennen, 447.
- Dunkirk shale, Devonian, New York: Hartnagel, 432.
- Duplin formation, Miocene, North Carolina: Clark *et al.*, 193.
- Eagle sandstone, Cretaceous, Montana: Pepperberg, 842.
- Eagle River group, Cambrian, Michigan: Lane, 627.
- East Wellington formation, Cretaceous, British Columbia: Clapp, 183.
- Eden shale, Ordovician, Ohio: Fuller and Clapp, 346.
- Edgewood formation, Silurian, Illinois: Lines, 670.
- Edmonton formation, Cretaceous, Alberta: Ries and Keele, 916.
- Edwards limestone, Cretaceous, Texas: Paige, 817.
- Eileen sandstone, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Eldon formation, Cambrian, British Columbia: Allan, 9; Walcott, 1152.
- Elgin sandstone, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Elgin terrane, Ordovician, Iowa: Keyes, 577.
- Elisa quartz monzonite porphyry, Tertiary, Mexico: Lee, 650.
- Elk Lick limestone, Carboniferous, West Virginia: Hennen, 447.
- Ellenburger limestone, Cambrian and Ordovician, Texas: Paige, 817.
- Ellis formation, Jurassic, Montana: Calvert, 159.
- Elm Grove limestone, Carboniferous, West Virginia: Hennen, 447.
- Elmtree slates, Silurian, New Brunswick: Young, 1258.
- Ely formation, Devonian, Nevada: Hershey, 452.
- Embar formation, Carboniferous, Wyoming: Jamison, 539.
- Eminence formation, Cambrian, Missouri: Crane, 233.
- Enfield shale, Devonian, New York: Hartnagel, 432.
- Erian group, Devonian: Hartnagel, 432.
- Erie shale, Devonian, Ohio: Prosser, 872.
- Eska conglomerate, Tertiary, Alaska: Martin and Katz, 722.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Esopus grit, Devonian, New York: Hartnagel, 432.
- Esopus shale, Devonian, New York: Kindle, 581.
- Essex limestone, Silurian, Illinois: Savage, 935.
- Etchegoin division, Miocene, California: Dumble, 293.
- Euclid sandstone lentil, Devonian, Ohio: Prosser, 872.
- Eureka formation, Nevada: Hershey, 452.
- Ewing limestone, Carboniferous, West Virginia: Hennen, 447.
- Extension formation, Cretaceous, British Columbia: Clapp, 183.
- Fairhaven member, Miocene, Maryland: Miller, 758.
- Farnham series, Ordovician, Quebec: Harvie, 433.
- Faulconer division, Ordovician, Kentucky: Foerste, 327.
- Fayette terrane, Devonian, Iowa: Keyes, 577.
- Fayetteville shale, Mississippian, Oklahoma: Snider, 1005.
- Fern Glen formation, Missouri: Crane, 233.
- Ferne shale, Jurassic, Alberta: Dowling, 285; Leach, 643.
- Finnie sandstone, Carboniferous, Kentucky: Glenn, 371.
- Fish Creek sandstone, Carboniferous, West Virginia: Hennen, 447.
- Fishkill limestone, Cambrian, New York: Hartnagel, 432.
- Fishpot ("Sewickley") limestone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Flaming Gorge formation, Cretaceous, Utah: Lupton, 689.
- Floyd formation, Mississippian, Georgia: Maynard, 738.
- Floyd limestone, Devonian, Iowa: Thomas, 1076.
- Forbes terrane, Cretaceous, Iowa: Keyes, 577.
- Fordham gneiss, pre-Cambrian, New York: Hartnagel, 432.
- Fort Ancient division, Ordovician, Ohio and Kentucky: Foerste, 327.
- Fort Benton formation, Cretaceous, Wyoming: Jamison, 539.
- Fort Hays limestone, Cretaceous, Kansas: Parker, 826.
- Fort Payne chert, Mississippian, Georgia: Maynard, 738.
- Fort Riley limestone, Permian, Oklahoma: Ohern and Garrett, 803.
- Fort Scott formation, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Fort Union formation, Wyoming: Jamison, 539; Winchester, 1231.
- Fort Union formation, Eocene, North Dakota: Leonard, 654.
- Fort Union formation, Eocene, Wyoming: Davis, 269.
- Fort Union formation, Tertiary, Montana: Beekly, 63; Calvert, 157; Herald, 448; Pepperberg, 842.
- Fort Union formation, Tertiary, North Dakota: Pishel, 861.
- Fort Union formation, Tertiary, Wyoming: Wegemann, 1179; Woodruff and Winchester, 1246.
- Fournier group, Ordovician to Devonian, New Brunswick: Young, 1258.
- Fox Hills sandstone, Cretaceous, North Dakota: Leonard, 654.
- Fox Hills sandstone, Cretaceous, Wyoming: Jamison, 540; Wegemann, 1178, 1179.
- Fox Hills sandstone, Wyoming: Winchester, 1231.
- Frankfort shale, Ordovician, New York: Hartnagel, 432.
- Franklin group, Paleozoic, British Columbia: Drysdale, 289.
- Franklin limestone, Algonkian, Pennsylvania: Miller, 757.
- Franklin limestone, pre-Cambrian, New York: Hartnagel, 432.
- Franklin series, Eocene, Washington: Evans, 313.
- Freda sandstone, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Freda sandstones, Cambrian, Michigan: Lane, 627.
- Fredericksburg group, Cretaceous, Texas: Paige, 817.
- Fulton green shale, Carboniferous, West Virginia: Hennen, 447.
- Furnaceville iron ore, Silurian, New York: Hartnagel, 432.
- Fuson shale, Cretaceous, Wyoming-South Dakota: Stone, 1045.
- Gabriola formation, Cretaceous, British Columbia: Clapp, 183.
- Galena dolomite, Ordovician, Iowa: Norton *et al.*, 800.
- Galena terrane, Ordovician, Iowa: Keyes, 577.
- Galena-Trenton limestone, Ordovician, Illinois: Udden, 1117.
- Galisteo sandstone, Tertiary?, New Mexico: Lee, 648.
- Gardeau flags and shale, Devonian, New York: Hartnagel, 432.
- Gasconade formation, Cambrian, Missouri: Crane, 233.
- Genesee beds, Devonian, New York: Hartnagel, 432.
- Genesee black shale member, Devonian, West Virginia: Stose and Swartz, 1058.
- Genesee shale, Devonian, Ontario: Stauffer, 1023.
- Georgia beds, Cambrian, New York: Hartnagel, 432.
- Georgian group, Cambrian, New York: Hartnagel, 432.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Genundewa limestone, Devonian, New York: Hartnagel, 432.
- Gering, Oligocene, Nebraska: Osborn, 815.
- Gilbert division, Ordovician, Kentucky: Foerste, 327.
- Gilboy sandstone, Carboniferous, West Virginia: Hennen, 447.
- Gilmore limestone, Carboniferous, West Virginia: Hennen, 447.
- Gilmore sandstone, Carboniferous, West Virginia: Hennen, 447.
- Girardeau formation, Silurian, Missouri: Crane, 233.
- Girardeau limestone, Silurian, Illinois: Lines, 670.
- Glacier division, Cambrian, British Columbia: Daly, 254.
- Glenierie limestone, Devonian, New York: Hartnagel, 432.
- Glen Park limestone, Devonian, Missouri: Crane, 233.
- Glens Falls limestone, Ordovician, New York: Hartnagel, 432.
- Glenwood terrane, Ordovician, Iowa: Keyes, 577.
- Gloucester formation, Paleozoic, British Columbia: Drysdale, 289.
- Goldenville formation, Cambrian or pre-Cambrian, Nova Scotia: Faribault, 318.
- Goodridge formation, Carboniferous, Utah: Woodruff, 1243.
- Goodsir formation, Ordovician, British Columbia: Allan, 9; Walcott, 1146.
- Goose Bay argillite, British Columbia: McConnell, 694.
- Goshen mica schist, Vermont: Hitchcock, 473.
- Grafton sandstone, Carboniferous, West Virginia: Hennen, 447.
- Grand Falls chert, Mississippian, Oklahoma: Snider, 1005.
- Graneros shale, Cretaceous, Wyoming-South Dakota: Stone, 1045.
- Graneros shale, Upper Cretaceous, Colorado: Stose, 1056.
- Grassy black shales, Carboniferous, Iowa, Missouri: Keyes, 578.
- Grassy black shale, Carboniferous, Missouri: Keyes, 578.
- Grassy terrane, Carboniferous, Iowa: Keyes, 577.
- Graves Creek formation, Pleistocene, Kentucky: Glenn, 373.
- Graydon sandstone, Pennsylvanian, Missouri: Crane, 233.
- Great Copper Harbor conglomerate, Cambrian, Michigan: Lane, 627.
- Great Valley limestone, Cambrian, Pennsylvania: Eaton, 303.
- Greenbrier limestone, Mississippian, Virginia: Branson, 103.
- Greenbrier limestone member, Mississippian, Pennsylvania: Munn, 782.
- Green River formation, Eocene, Colorado: Lee, 647.
- Green River formation, Tertiary, Utah: Lupton, 690.
- Greene formation, Permian, Pennsylvania: Munn, 782.
- Greenhorn limestone, Upper Cretaceous, Colorado: Stose, 1056.
- Grenville series, New York: Smyth, 1004.
- Grenville series, pre-Cambrian, New York: Hartnagel, 432.
- Grenville series, pre-Cambrian, Quebec: Stansfield, 1018.
- Grimes sandstone, Devonian, New York: Hartnagel, 432.
- Guelph dolomite, Silurian, New York: Hartnagel, 432.
- Gunflint iron-bearing formation, pre-Cambrian, Minnesota: Zapffe, 1260.
- Gunnison formation, Jurassic?, Colorado: Lee, 647.
- Gunn Peak formation, Carboniferous?, Washington: Weaver, 1168.
- Gunter sandstone member, Cambrian, Missouri: Crane, 233.
- Gwynedd formation, Triassic, Pennsylvania: Wherry, 1191.
- Halifax formation, Cambrian or pre-Cambrian, Nova Scotia: Faribault, 318.
- Hamilton, Devonian, New York: Kindle, 581.
- Hamilton beds, Devonian, New York: Hartnagel, 432.
- Hamilton beds, Devonian, Ontario: Stauffer, 1023.
- Hamilton formation, Devonian, Missouri: Crane, 233.
- Hamilton formation, Devonian, Pennsylvania: Miller, 757.
- Hamilton limestone and shale, Devonian, Illinois: Lines, 670.
- Hamilton shale member, Devonian, West Virginia: Stose and Swartz, 1058.
- Hannibal shales, Carboniferous, Iowa, Missouri: Keyes, 578.
- Hannibal shale, Mississippian, Missouri: Crane, 233.
- Hannibal terrane, Carboniferous, Iowa: Keyes, 577.
- Hanover shales, Devonian, New York: Hartnagel, 432.
- Hardyston quartzite, Cambrian, Pennsylvania: Miller, 757; Peck, 839.
- Harlan sandstone, Carboniferous, Kentucky: Dilworth, 284.
- Harrison, Oligocene and Miocene, Nebraska: Osborn, 815.
- Harrison diorite, pre-Cambrian, New York: Hartnagel, 432.
- Hartwick terrane, Silurian, Iowa: Keyes, 577.
- Haslam formation, Cretaceous, British Columbia: Clapp, 183.
- Hatch shale and flags, Devonian, New York: Hartnagel, 432.
- Hawarden terrane, Cretaceous, Iowa: Keyes, 577.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Hazleton group, Jurassic, British Columbia: Malloch, 715.
- Hedges shale, Carboniferous, West Virginia: Stose and Swartz, 1058.
- Helderberg limestone, Devonian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Helderbergian group, Devonian: Hartnagel, 432.
- Helderbergian series, Devonian, Pennsylvania: Miller, 757.
- Henrietta diorite porphyry, Tertiary, Mexico: Lee, 650.
- Henrietta formation, Pennsylvanian, Missouri: Crane, 233; Hinds, 470.
- Herington limestone, Permian, Oklahoma: Ohern and Garrett, 803.
- Hickory sandstone, Cambrian, Texas: Paige, 817.
- High Falls shale, Silurian, New York: Hartnagel, 432.
- Highpoint sandstone, Devonian, New York: Hartnagel, 432.
- Hinton formation, Mississippian, Virginia: Branson, 103.
- Hitz layer, Ordovician, Indiana: Foerste, 327.
- Hogshooter limestone, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Holston, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Homewood sandstone member, Pennsylvanian, Kentucky: Phalen, 850.
- Hossekus limestone, Triassic, California: Smith, 995.
- Howard arkose formation, Tertiary, Washington: Weaver, 1168.
- Hoyt limestone, Cambrian, New York: Hartnagel, 432.
- Hozameen series, Carboniferous, British Columbia: Camsell, 164.
- Hudson River formation, Ordovician, Missouri: Crane, 233.
- Hudson River formation, Ordovician, Pennsylvania: Eaton, 303.
- Hundred sandstone, Carboniferous, West Virginia: Hennen, 447.
- Huron shale, Devonian, Ohio: Kindle, 581; Prosser, 872.
- Huron shale, Waverlyan, Ohio: Ulrich, 1122.
- Huronian?, pre-Cambrian, New York: Bancroft, 43.
- Huronian, pre-Cambrian, Ontario: Collins, 218; Moore, 780.
- Huronian, pre-Cambrian, Ontario and Quebec: Wilson, 1220.
- Huronian rocks, pre-Cambrian, Michigan: Lane, 627.
- Ice River formation, British Columbia: Burling, 135.
- Igaliko sandstone, Devonian?, Greenland: Ussing, 1130.
- Illinoian drift, Quaternary, Illinois: Udden, 1117.
- Iowa terrane, Quaternary, Iowa: Keyes, 577.
- Independence terrane, Devonian, Iowa: Keyes, 577.
- Indian Ladder beds, Ordovician, New York: Hartnagel, 432.
- Inwood limestone, pre-Cambrian, New York: Hartnagel, 432.
- Iowa terrane, Quaternary, Iowa: Keyes, 577.
- Iowan drift, Quaternary, Iowa: Norton *et al.*, 800.
- Irasburg conglomerate, Ordovician, Vermont: Richardson, 904; Richardson and Collister, 905; Richardson and Conway, 906.
- Irondequoit limestone, Silurian, New York: Hartnagel, 432.
- Ithaca beds, Devonian, New York: Hartnagel, 432.
- Jacalitos division, Miocene, California: Dumble, 293.
- Jameco formation, Quaternary, New York: Hartnagel, 432.
- James River formation, upper Cambrian, Nova Scotia: Williams, 1211.
- Jefferson limestone, Devonian, Idaho and Utah: Richards and Mansfield, 903.
- Jefferson limestone, Devonian, Montana: Calvert, 159.
- Jefferson City formation, Cambrian, Missouri: Crane, 233.
- Jennings formation, Devonian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Joachim formation, Ordovician, Missouri: Crane, 233.
- John Day, Oligocene and Miocene, Oregon: Osborn, 815.
- Jollytown sandstone, Carboniferous, West Virginia: Hennen, 447.
- Jordan sandstone, Cambrian, Iowa: Norton *et al.*, 800.
- Jordon terrane, Cambrian, Iowa: Keyes, 577.
- Jualin diorite, Cretaceous, Alaska: Knopf, 595.
- Judith River formation, Cretaceous, Montana: Pepperberg, 842.
- Judith River formation, Tertiary (Eocene), Montana: Peale, 837.
- Julianehaab granite, Algonkian, Greenland: Ussing, 1130.
- Juniata formation, Ordovician, West Virginia: Stose and Swartz, 1058.
- Kagawong beds, Ordovician, Ontario: Foerste, 329.
- Kalkberg limestone, Devonian, New York: Hartnagel, 432.
- Kamishak chert, Triassic, Alaska: Martin and Katz, 721.
- Kamouraska formation, Cambrian, Quebec: Dresser, 288.
- Kanouse sandstone, Devonian, New Jersey: Clarke, 198.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Kanouse sandstone, Devonian, New York: Hartnagel, 432.
- Kansan drift, Quaternary, South Dakota: Shimek, 976.
- Kansas terrane, Quaternary, Iowa: Keyes, 577.
- Kansas City limestone, Pennsylvanian, Missouri: Hinds, 470.
- Keefer sandstone member, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Keewatin, pre-Cambrian, Ontario: Burrows, 137; Collins, 218; Lawson, 637; Moore, 780.
- Keewatin, pre-Cambrian, Ontario and Quebec: Wilson, 1220.
- Keewatin, pre-Cambrian, Quebec: Bancroft, 43.
- Keewatin greenstones, pre-Cambrian, Minnesota: Zapffe, 1260.
- Keewatin rocks, pre-Cambrian, Michigan: Lane, 627.
- Keewatin series, pre-Cambrian, Ontario: Hopkins, 491; McMillan, 709.
- Keokuk formation, Mississippian, Missouri: Crane, 233.
- Keokuk limestone, Mississippian, Illinois: Lines, 670.
- Keokuk terrane, Carboniferous, Iowa: Keyes, 577.
- Ketona dolomite, Alabama: Butts, 148.
- Kettle River formation, Oligocene?, British Columbia: Drysdale, 289.
- Kettle River formation, Tertiary, British Columbia: LeRoy, 655.
- Keweenaw series, Cambrian, Michigan: Lane, 627.
- Keweenawan, pre-Cambrian, Ontario, Moore, 780.
- Keweenawan rocks, Cambrian, Michigan: Lane, 627.
- Keweenawan rocks, pre-Cambrian, Minnesota: Zapffe, 1260.
- Kilbuck conglomerate, Mississippian, New York: Hartnagel, 432.
- Kimmswick formation, Ordovician, Missouri: Crane, 233.
- Kinderhook beds, Mississippian, Illinois: Lines, 670.
- Kinderhook group, Mississippian, Iowa: Norton *et al.*, 800.
- Kinderhook shale, Mississippian, Illinois: Udden, 1117.
- Kirkfield limestone, Ordovician, Ontario: Johnston, 557.
- Kirkwood formation, Quaternary, New York: Hartnagel, 432.
- Kitchener formation, Cambrian, British Columbia: Schofield, 953.
- Klusha intrusives, Tertiary or Pleistocene, Yukon: Cairnes, 149.
- Knapp beds, Mississippian, New York: Hartnagel, 432.
- Knight formation, Tertiary, Wyoming: Sinclair and Granger, 985.
- Knob Hill group, Paleozoic, British Columbia: LeRoy, 655.
- Knobstone formation, Indiana: Cumings, 244.
- Knox dolomite, Cambro-Ordovician, Georgia: Maynard, 738.
- Knox dolomite, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Knoydart formation, Devonian, Nova Scotia: Williams, 1211.
- Kootanie formation, Cretaceous, Alberta: Dowling, 285.
- Kootenai formation, Cretaceous, Montana: Calvert, 158, 159.
- Kootenay formation, Cretaceous, Alberta: Leach, 643.
- Kummer series, Eocene, Washington: Evans, 313.
- Laberge series, Jurassic-Cretaceous, Yukon: Cairnes, 149.
- Labette shale, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Ladentown diabase, Jura-Trias, New York: Hartnagel, 432.
- Lafayette formation, Pliocene, Kentucky: Glenn, 373.
- Lafayette formation, Pliocene?, North Carolina: Clark *et al.*, 193.
- Lafayette formation, Pliocene?, Virginia: Clark and Miller, 192.
- LaFayette group, Tertiary, Missouri: Crane, 233.
- LaGrange group, Tertiary, Missouri: Crane, 233.
- Lake Shore traps, Cambrian, Michigan: Lane, 627.
- Lakota sandstone, Cretaceous, Wyoming-South Dakota: Stone, 1045.
- Lamotte formation, Cambrian, Missouri: Crane, 233.
- Lance formation, Wyoming: Winchester, 1231.
- Lance formation, Cretaceous or Tertiary, Montana: Beekly, 63; Calvert, 157; Herald, 448.
- Lance formation, Cretaceous or Tertiary, North Dakota: Leonard, 654.
- Lance formation, Cretaceous or Tertiary, Wyoming: Wegemann, 1179.
- Langston limestone, Cambrian, Idaho and Utah: Richards and Mansfield, 903.
- Lansdale member, Triassic, Pennsylvania: Wherry, 1191.
- Lansing formation, Pennsylvanian, Missouri: Hinds, 470.
- Laona sandstone, Devonian, New York: Hartnagel, 432.
- La Plata sandstone, Jurassic, Utah: Woodruff, 1243.
- Laramie formation, Cretaceous, Colorado and New Mexico: Lee, 648.
- Laramie formation, Cretaceous, Wyoming: Jamison, 539, 540.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Laramie formation, Cretaceous and Tertiary, Manitoba and Saskatchewan: Ries and Keele, 916.
- Larder slates and dolomites, pre-Cambrian, Ontario and Quebec: Wilson, 1220.
- LaSalle limestone, Pennsylvanian, Illinois: Lines, 670.
- Laughery formation, Ordovician, Indiana: Foerste, 327.
- Laurention, pre-Cambrian, New York: Bancroft, 43.
- Laurention, pre-Cambrian, Ontario: Burrows, 137; Collins, 218; Lawson, 637; Moore, 780.
- Laurentian, pre-Cambrian, Ontario and Quebec: Wilson, 1220.
- Laurentian series, pre-Cambrian, Ontario: Hopkins, 491.
- Lawrence terrane, Cretaceous, Iowa: Keyes, 577.
- Leadville limestone, Carboniferous, Colorado: Patton *et al.*, 834.
- LeClaire terrane, Silurian, Iowa: Keyes, 577.
- Lee conglomerate, Carboniferous, Kentucky: Dilworth, 284.
- Lee formation, Carboniferous, Kentucky: Miller, 756.
- Leech River formation, Carboniferous?, British Columbia (Vancouver Island): Clapp, 182; Clapp and Allan, 185.
- Lehigh limestone, Ordovician, Pennsylvania: Peck, 839.
- Leitchfield formation, Mississippian, Kentucky: Glenn, 373.
- Leithsville formation, Cambrian, Pennsylvania: Peck, 839.
- Leithsville shaly limestone, Cambrian, Pennsylvania: Miller, 757.
- Lenapah limestone, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Lenoir beds, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Leray limestone, Ordovician, New York: Hartnagel, 432.
- Levis formation, Ordovician, Ontario: Raymond, 888.
- Lewis shale, Cretaceous, Colorado and New Mexico: Lee, 648.
- Lewis shale, Cretaceous, Wyoming: Jamison, 539.
- Lewiston, Silurian, New York: Hartnagel, 432.
- Leyden phyllite, Vermont: Hitchcock, 473.
- Lime Creek shale, Devonian, Iowa: Norton *et al.*, 800.
- Lime Creek shales, Devonian, Iowa: Keyes, 578.
- Lime Creek terrane, Devonian, Iowa: Keyes, 577.
- Lincoln formation, Oligocene, Washington: Weaver, 1169.
- L'Islet formation, Cambrian, Quebec: Dresser, 288.
- Lisman formation, Pennsylvanian, Kentucky: Glenn, 373.
- Listmore formation, Pennsylvanian?, Nova Scotia: Williams, 1211.
- Little Falls dolomite, Cambrian, New York: Hartnagel, 432.
- Little Pine Ridge sandstone, Cretaceous, Wyoming: Jamison, 540.
- Livingston conglomerate, Carboniferous, Kentucky: Miller, 756.
- Livingston formation, Cretaceous, Montana: Calvert, 158.
- Lloyd sand, Cretaceous, New York: Hartnagel, 432.
- Lockatong formation, Triassic, New Jersey: Wherry, 1191.
- Lockhart formation, Mississippian, Kentucky: Glenn, 373.
- Lockport dolomite, Silurian, New York: Hartnagel, 432.
- Logan formation, Mississippian, Kentucky: Phalen, 850.
- Logan formation, Mississippian, Ohio: Hyde, 528.
- Logan sills, pre-Cambrian, Minnesota: Zapffe, 1260.
- Long Beards Riffs sandstone, Devonian, New York: Hartnagel, 432.
- Longwood shale, Silurian, New York: Hartnagel, 432.
- Lookout formation, Pennsylvanian, Georgia: Maynard, 738.
- Lorraine, Ordovician, New York: Hartnagel, 432.
- Lorraine shale, Ordovician, Pennsylvania: Ziegler, 1262.
- Lost Cabin formation, Eocene, Wyoming: Osborn, 815.
- Lost Cabin formation, Tertiary, Wyoming: Sinclair and Granger, 985.
- Louisiana limestone, Carboniferous, Iowa, Missouri: Keyes, 578.
- Louisiana limestone, Mississippian, Missouri: Crane, 233.
- Louisiana terrane, Carboniferous, Iowa: Keyes, 577.
- Lower Magnesian limestone, Ordovician, Illinois: Lines, 670.
- Lowerre quartzite, pre-Cambrian, New York: Hartnagel, 432.
- Lowville, Ordovician, Ontario: Foerste, 329.
- Lowville beds, Ordovician, Ontario: Johnston, 557.
- Lowville formation, Ordovician, Ontario: Raymond, 888.
- Lowville limestone, Ordovician, New York: Hartnagel, 432.
- Lucas terrane, Devonian, Iowa: Keyes, 577.
- Ludlowville shale, Devonian, New York: Hartnagel, 432.
- Lykins formation, Carboniferous, Colorado: Girty, 368.
- Lysite formation, Eocene, Wyoming: Osborn, 815.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Lysite formation, Tertiary, Wyoming: Sinclair and Granger, 985.
- McAdam formation, Silurian, Nova Scotia: Williams, 1211.
- McAra's Brook formation, Mississippian, Nova Scotia: Williams, 1211.
- McKenzie formation, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- McLeansboro formation, Carboniferous, Illinois: Shaw, 970.
- McLeansboro formation, Pennsylvanian, Illinois: Lines, 670.
- McLeansboro formation, Pennsylvanian, Illinois: Shaw and Savage, 972.
- Madison limestone, Carboniferous (Mississippian), Idaho and Utah: Richards and Mansfield, 903.
- Madison limestone, Mississippian, Montana: Calvert, 159.
- Madisonville limestone, Carboniferous, Kentucky: Glenn, 371.
- Magothy formation, Cretaceous, New York: Hartnagel, 432.
- Mahoning sandstone member, Pennsylvanian, Ohio, West Virginia, Kentucky: Phalen, 850.
- Malignant Cove formation, Ordovician, Nova Scotia: Williams, 1211.
- Mancos shale, Cretaceous, Colorado: Lee, 647, 648.
- Mancos shale, Cretaceous, New Mexico: Lee, 646.
- Mancos shale, Cretaceous, Utah: Lupton, 689, 690.
- Mancos shale, Cretaceous, Wyoming: Woodruff and Winchester, 1246.
- Manhattan schist, pre-Cambrian, New York: Hartnagel, 432.
- Manitoban, Devonian, Manitoba: Kindle, 584.
- Manlius limestone, Devonian, New York: Kindle, 581.
- Manlius limestone, Silurian, New York: Hartnagel, 432.
- Mannington sandstone, Carboniferous, West Virginia: Hennen, 447.
- Mansfield sandstone, Mississippian, Indiana: Cumings, 244.
- Maquoketa shale, Ordovician, Illinois: Lines, 670.
- Maquoketa shale, Ordovician, Iowa: Norton *et al.*, 800.
- Marais des Cygnes terrane, Carboniferous, Iowa: Keyes, 577.
- Marble Falls limestone, Pennsylvanian, Texas: Paige, 817.
- Marcellus, Devonian, New York: Kindle, 581.
- Marcellus black shale, Devonian, New York: Hartnagel, 432.
- Marcellus? formation, Devonian, Pennsylvania: Miller, 757.
- Marcellus shale, Devonian, Ontario: Stauffer, 1023.
- Marcellus shale member, Devonian, West Virginia: Stose and Swartz, 1058.
- Marietta sandstone (upper), Carboniferous, West Virginia: Hennen, 447.
- Marietta sandstone (lower), Carboniferous, West Virginia: Hennen, 447.
- Maroon conglomerate, Pennsylvanian?, Colorado: Lee, 647.
- Martinez formation, Eocene, California: Dumble, 293.
- Martinsburg shale, Ordovician, Pennsylvania: Peck, 839.
- Martinsburg shale, Ordovician, West Virginia: Stose and Swartz, 1058.
- Martinsburg shales, Ordovician, Pennsylvania: Miller, 757.
- Matawan formation, Cretaceous, New York: Hartnagel, 432.
- Matfield shale, Permian, Oklahoma: Ohern and Garrett, 803.
- Mauch Chunk formation, Mississippian, Pennsylvania: Munn, 782.
- Maury shale, Waverlyan, Tennessee: Ulrich, 1122.
- Maysville formation, Ordovician, Ohio: Fuller and Clapp, 346.
- Maxville limestone, Mississippian, Kentucky: Phalen, 850.
- Maxville limestone, Mississippian, Ohio: Hyde, 528.
- Mazanilla series, Costa Rica: Romanes, 931.
- Meadville limestone, Mississippian, Pennsylvania and Ohio: Prosser, 872.
- Medina sandstone, Silurian, New York: Hartnagel, 432.
- Meetinghouse Hill slate, Vermont: Hitchcock, 473.
- Memphremagog slates, Vermont: Hitchcock, 473.
- Menteth limestone, Devonian, New York: Hartnagel, 432.
- Mesaverde formation, Cretaceous, Colorado: Lee, 647.
- Mesaverde formation, Cretaceous, Colorado and New Mexico: Lee, 648.
- Mesaverde formation, Cretaceous, New Mexico: Lee, 646.
- Mesaverde formation, Cretaceous, Utah: Lupton, 690.
- Mesaverde formation, Cretaceous, Wyoming: Jamison, 539; Woodruff and Winchester, 1246.
- Metchosin volcanics, Jurassic?, British Columbia (Vancouver Island): Clapp, 182; Clapp and Allan, 185.
- Middlesex shale, Devonian, New York: Hartnagel, 432.
- Midway volcanic group, Miocene?, British Columbia: Drysdale, 289; LeRoy, 655.
- Million member, Ordovician, Kentucky: Foerste, 327.
- Millstone grit group, Carboniferous, New Brunswick: Young, 1259.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Millstream series, Ordovician, New Brunswick: Young, 1258.
- Mississippian group, Carboniferous: Hartnagel, 432.
- Mississippian series, Carboniferous, Illinois: Shaw, 970.
- Missouri group, Pennsylvanian, Iowa: Norton *et al.*, 800.
- Missouri group, Pennsylvanian, Missouri: Hinds, 470.
- Missouri series, Pennsylvanian, Missouri: Crane, 233.
- Moencopie formation, Permian(?), Utah: Woodruff, 1243.
- Mohawkian group, Ordovician, New York: Hartnagel, 432.
- Monmouth formation, Cretaceous, New York: Hartnagel, 432.
- Monongahela formation, Pennsylvanian, Pennsylvania: Munn, 782.
- Monongahela formation, Pennsylvanian, West Virginia: Phalen, 850.
- Monongahela series, Carboniferous, West Virginia: Hennen, 447.
- Monroe Creek, Oligocene, Nebraska: Osborn, 815.
- Monroe formation, Silurian, Ohio: Stauffer, 1025.
- Montana group, Cretaceous, Montana: Calvert, 158, 159.
- Montana group, Cretaceous, Wyoming: Wegemann, 1179.
- Montecello terrane, Silurian, Iowa: Keyes, 577.
- Monterey division, Miocene, California: Dumble, 293.
- Monterey series, Neocene, California: Clark, 188.
- Monterey series, Tertiary, California: Martin, 718.
- Montesano formation, Miocene, Washington: Weaver, 1169.
- Montrose chert, Carboniferous, Iowa: Van Tuyl, 1138.
- Monument Creek group, Tertiary, Colorado: Richardson, 908, 909.
- Morgantown sandstone, Carboniferous, West Virginia: Hennen, 447.
- Morgantown (?) sandstone member, Pennsylvanian, Ohio, West Virginia, Kentucky: Phalen, 850.
- Morrison (?) formation, Cretaceous or Jurassic, Montana: Calvert, 159.
- Morrison formation, Cretaceous, New Mexico: Lee, 646.
- Morrison formation, Lower Cretaceous or Jurassic, Colorado: Stose, 1056.
- Morrison formation, Jurassic, Wyoming: Jamison, 539, 540; Wegemann, 1178.
- Morrison shale, Jurassic or Cretaceous, Wyoming-South Dakota: Stone, 1045.
- Moscow shale, Devonian, New York: Hartnagel, 432.
- Mosheim limestone, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Mount Morris limestone, Carboniferous, West Virginia: Hennen, 447.
- Mount Stevens group, Paleozoic, Yukon: Cairnes, 149.
- Mt. Whyte formation, Cambrian, British Columbia: Allan, 9.
- Mowry beds, Cretaceous, Wyoming: Jamison, 540.
- Mowry shale member, Cretaceous, Wyoming: Wegemann, 1178.
- Moydart formation, Silurian, Nova Scotia: Williams, 1211.
- Moyie formation, Cambrian, British Columbia: Schofield, 953.
- Mulford formation, Pennsylvanian, Kentucky: Glenn, 373.
- Murphy marble, Cambrian, Georgia: Maynard, 738.
- Myers shale, Carboniferous, West Virginia: Stose and Swartz, 1058.
- Naknek formation, Jurassic, Alaska: Martin and Katz, 721.
- Nanaimo series, Cretaceous, British Columbia: Clapp, 183.
- Nanjemoy formation, Eocene, Maryland: Miller, 758.
- Nanjemoy formation, Eocene, Virginia: Clark and Miller, 192.
- Naples beds, Devonian, New York: Hartnagel, 432.
- Nass formation, British Columbia: McConnell, 695, 696.
- Nazareth limestone, Ordovician, Pennsylvania: Miller, 757; Peck, 839.
- Nebraska terrane, Quaternary, Iowa: Keyes, 577.
- Nebraskan drift, Quaternary, South Dakota: Shimek, 976.
- Neelytown limestone, Cambrian, New York: Hartnagel, 432.
- Nelson batholith, Jurassic?, British Columbia: LeRoy, 656.
- Nenana gravel, Tertiary, Alaska: Capps, 170.
- New Albany black shale, Indiana: Cumings, 244.
- Newark group, Triassic, North Carolina: Stone, 1046.
- Newark group, Triassic, Pennsylvania: Wherry, 1191.
- Newark series, Jura-Trias, New York: Hartnagel, 432.
- Newark series, Triassic, Pennsylvania: Eaton, 303.
- Newcastle formation, Cretaceous, British Columbia: Clapp, 183.
- Newfoundland grit, Devonian, New York: Clarke, 198.
- Newman limestone, Carboniferous, Kentucky: Miller, 756.
- New Providence shale, Indiana: Cumings, 244.
- New Richmond terrane, Cambrian, Iowa: Keyes, 577.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- New Scotland formation, Devonian, Illinois : Lines, 670.
- New Scotland limestone, Devonian, New York : Hartnagel, 432 ; Kindle, 581.
- Niagara dolomite, Silurian, Iowa : Norton *et al.*, 800.
- Niagara formation, Silurian, Missouri : Crane, 233.
- Niagara limestone, Silurian, Illinois : Udden, 1117.
- Niagara limestone, Silurian, Ohio : Fuller and Clapp, 346.
- Niagaran group, Silurian, New York : Hartnagel, 432.
- Nicola series, Triassic and Jurassic?, British Columbia : Daly, 254.
- Nicoyan series, Miocene, Costa Rica : Romanes, 932.
- Nineveh limestone member, Permian, Pennsylvania : Munn, 782.
- Nineveh sandstone, Carboniferous, West Virginia : Hennen, 447.
- Niobrara formation, Cretaceous, Kansas : Parker, 826.
- Niobrara formation, Cretaceous, Manitoba : Ries and Keele, 916.
- Niobrara formation, Cretaceous, Wyoming : Jamison, 540.
- Niobrara shale, Cretaceous, Wyoming : Wegemann, 1178.
- Niobrara terrane, Cretaceous, Iowa : Keyes, 577.
- Nipisiguit granite, Devonian?, New Brunswick : Young, 1258.
- Nipissing diabase, pre-Cambrian, Quebec : Wilson, 1221.
- Nisconlith series, pre-Cambrian, British Columbia : Daly, 255.
- Nishnabotna terrane, Cretaceous, Iowa : Keyes, 577.
- Nisky limestone, Ordovician, Pennsylvania : Miller, 757.
- Nitinat formation, Jurassic or Triassic?, British Columbia (Vancouver Island) : Clapp, 182 ; Clapp and Allan, 185.
- Nonesuch formation, pre-Cambrian, Wisconsin : Thwaites, 1085.
- Nonesuch shales, Cambrian, Michigan, Michigan : Lane, 627.
- Normanskill shale, Ordovician, New York : Hartnagel, 432.
- Norristown formation, Triassic, Pennsylvania : Wherry, 1191.
- Northumberland formation, Cretaceous, British Columbia : Clapp, 183.
- Nounan limestone, Cambrian, Idaho and Utah : Richards and Mansfield, 903.
- Nowata shale, Carboniferous, Oklahoma : Ohern and Garrett, 803.
- Nugget sandstone, Jurassic or Triassic, Idaho and Utah : Richards and Mansfield, 903.
- Nugget sandstone, Triassic or Jurassic, Utah : Boutwell, 92.
- Nunda sandstone, Devonian, New York : Hartnagel, 432.
- Nussbaum formation, Pliocene (?), Colorado : Stose, 1056.
- Ohio Creek conglomerate, Eocene, Colorado : Lee, 647.
- Ohio shale, Devonian, Illinois : Lines, 670.
- Ohio shale, Devonian, Ohio : Hyde, 528 ; Prosser, 872 ; Stauffer, 1025.
- Ohio shale group, Devonian, Ohio : Kindle, 581.
- Olean conglomerate, Pennsylvanian, New York : Hartnagel, 432.
- Olentangy shales, Devonian, Ohio : Kindle, 581 ; Stauffer, 1025.
- Oljato sandstone member, Permian, Utah : Woodruff, 1243.
- Olmsted shale, Ohio : Cushing, 246.
- Olmsted shale, Devonian, Ohio : Kindle, 581.
- Olmsted shale, Waverlyan, Ohio : Ulrich, 1122.
- Oneida conglomerate, Silurian, New York : Hartnagel, 432.
- Oneonta sandstone, Devonian, New York : Hartnagel, 432.
- Oneota terrane, Cambrian, Iowa : Keyes, 577.
- Onondaga, Devonian, New York : Kindle, 581.
- Onondaga formation, Devonian, Missouri : Crane, 233.
- Onondaga limestone, Devonian, Illinois : Lines, 670.
- Onondaga limestone, Devonian, New York : Hartnagel, 432.
- Onondaga limestone, Devonian, Ontario : Stauffer, 1023, 1024.
- Onondaga shale member, Devonian, West Virginia : Stose and Swartz, 1058.
- Onondaga shale member of Romney formation, Devonian, Maryland, West Virginia, and Virginia : Kindle, 581.
- Onondagan series, Devonian, Pennsylvania : Miller, 757.
- Ontarian system, pre-Cambrian, Ontario : Lawson, 637.
- Ontario or Siluric system : Hartnagel, 432.
- Orange group, Cretaceous?, Alaska and Yukon : Cairnes, 154.
- Orange group, Mesozoic (probably Cretaceous), Alaska and Yukon : Cairnes, 150.
- Orangeville formation, Mississippian, Ohio : Prosser, 872.
- Orangeville shale, Ohio : Cushing, 246.
- Oread limestone, Carboniferous, Oklahoma : Ohern and Garrett, 803.
- Oregonia division, Ordovician, Ohio and Kentucky : Foerste, 328.
- Orienta sandstone, pre-Cambrian, Wisconsin : Thwaites, 1085.
- Orindan, Neocene, California : Clark, 188.
- Oriskanian group, Devonian : Hartnagel, 432.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Oriskany, Devonian, New York: Kindle, 581.
- Oriskany formation, Devonian, Pennsylvania: Miller, 757.
- Oriskany sandstone, Devonian, New York: Hartnagel, 432.
- Oriskany sandstone, Devonian, Ontario: Stauffer, 1023, 1024.
- Oriskany sandstone, Devonian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Oro Grande series, California: Hershey, 452.
- Oronto group, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Osage group, Mississippian, Iowa: Norton *et al.*, 800.
- Osage series, Carboniferous, Iowa: Van Tuyl, 1138.
- Oswayo beds, Mississippian, New York: Hartnagel, 432.
- Oswegan group, Silurian: Hartnagel, 432.
- Oswego sandstone, Silurian, New York: Hartnagel, 432.
- Otis terrane, Devonian, Iowa: Keyes, 577.
- Otselic sands and shales, Devonian, New York: Hartnagel, 432.
- Ottawa gneiss, pre-Cambrian, Quebec: Stansfield, 1018.
- Ottertall formation, Cambrian, British Columbia: Allan, 9; Walcott, 1146.
- Outer conglomerate, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Outer Copper Harbor conglomerate, Cambrian, Michigan: Lane, 627.
- Oxmoor sandstone, Mississippian, Georgia: Maynard, 738.
- Paget formation, Cambrian, British Columbia: Allan, 9.
- Paint Lick member, Ordovician, Kentucky: Foerste, 327.
- Palisade diabase, Jura-Trias, New York: Hartnagel, 432.
- Pamelia formation, Ordovician, Ontario: Raymond, 888.
- Pamelia limestone, Ordovician, New York: Hartnagel, 432.
- Pamlico formation, Pleistocene, North Carolina: Clark *et al.*, 193.
- Pamunkey group, Eocene, Maryland: Miller, 758.
- Pamunkey group, Eocene, Virginia: Clark and Miller, 192.
- Panamo conglomerate, Mississippian, New York: Hartnagel, 432.
- Paonia shale member, Cretaceous, Colorado: Lee, 647.
- Papagallo shales, Cretaceous, Mexico: Dumble, 294.
- Park City formation, Carboniferous, Utah: Boutwell, 92.
- Parkhead sandstone member, Devonian, West Virginia: Stose and Swartz, 1058.
- Parkman member, Cretaceous, Wyoming: Jamison, 540.
- Parkville terrane, Cretaceous, Iowa: Keyes, 577.
- Parrish limestone, Devonian, New York: Hartnagel, 432.
- Pasayton formation, Lower Cretaceous, British Columbia: Camsell, 164.
- Paspotansa marl member, Eocene, Maryland: Miller, 758.
- Paspotansa marl member, Eocene, Virginia: Clark and Miller, 192.
- Patapsco formation, Cretaceous, Virginia: Berry, 67.
- Patapsco formation, Lower Cretaceous, Virginia: Clark and Miller, 192.
- Patuxent formation, Cretaceous, North Carolina: Clark *et al.*, 193.
- Patuxent formation, Cretaceous, Virginia: Berry, 67.
- Patuxent formation, Lower Cretaceous, Virginia: Clark and Miller, 192.
- Pawnee limestone, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Pearl Harbor series, Pliocene, Hawaiian Islands: Hitchcock, 474.
- Pearl Harbor series, Tertiary, Hawaii: Hitchcock, 472.
- Peedee sand, Cretaceous, North Carolina: Clark *et al.*, 193.
- Peekskill granite, pre-Cambrian, New York: Hartnagel, 432.
- Pelona schists, California and Oregon: Hershey, 452.
- Pend d'Oreille group, Carboniferous?, British Columbia: LeRoy, 656.
- Pennington shale, Carboniferous, Kentucky: Miller, 756.
- Pennsylvanian group, Carboniferous: Hartnagel, 432.
- Pennsylvanian series, Carboniferous, Illinois: Shaw, 970.
- Pennsylvanian series, Illinois: Udden, 1117.
- Pensauken formation, Quaternary, New York: Hartnagel, 432.
- Peoria terrane, Quaternary, Iowa: Keyes, 577.
- Perkasie member, Triassic, Pennsylvania: Wherry, 1191.
- Perkins group, Paleozoic, Yukon: Cairnes, 149.
- Perryville member, Ordovician, Kentucky: Foerste, 327.
- Phosphoria formation, Carboniferous (Permian?), Idaho and Utah: Richards and Mansfield, 903.
- Pickering gneiss, pre-Cambrian, Pennsylvania: Miller, 759.
- Pictured Cliffs sandstone, Cretaceous, Colorado and New Mexico: Lee, 648.
- Pierre formation, Cretaceous, Manitoba: Ries and Keele, 916.
- Pierre formation, Cretaceous, Wyoming: Jamison, 540; Wegemann, 1178, 1179.
- Pierre shale, Cretaceous, Kansas: Parker, 826.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Pierre shale, Cretaceous, Montana: Beekly, 63; Calvert, 157.
- Pierre shale, Cretaceous, South Dakota: Perisho and Visher, 843.
- Pinkerton sandstone, Carboniferous, West Virginia: Stose and Swartz, 1058.
- Pinole tuff, Neocene, California: Clark, 188.
- Piscataway member, Eocene, Maryland: Miller, 758.
- Piscataway marl member, Eocene, Virginia: Clark and Miller, 192.
- Pit shales, Triassic, California: Smith, 995.
- Pitkin limestone, Mississippian, Oklahoma: Snider, 1005.
- Pittsburgh limestone (upper), Carboniferous, West Virginia: Hennen, 447.
- Pittsburgh limestone (lower), Carboniferous, West Virginia: Hennen, 447.
- Pittsburgh red shale, Carboniferous, West Virginia: Hennen, 447.
- Pittsburgh sandstone (lower), Carboniferous, West Virginia: Hennen, 447.
- Pittsburgh sandstone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Pittsford shale, Silurian, New York: Hartnagel, 432.
- Platte terrane, Cretaceous, Iowa: Keyes, 577.
- Platteville limestone, Ordovician, Illinois: Lines, 670.
- Platteville limestone, Ordovician, Iowa: Norton *et al.*, 800.
- Platteville terrane, Ordovician, Iowa: Keyes, 577.
- Plattin formation, Ordovician, Missouri: Crane, 233.
- Plattsmouth terrane, Cretaceous, Iowa: Keyes, 577.
- Pleasanton formation, Pennsylvanian, Missouri: Crane, 233.
- Pleasanton shale, Pennsylvanian, Missouri: Hinds, 470.
- Plum Point marl member, Miocene, Maryland: Miller, 758.
- Pochuck gneiss, pre-Cambrian, New York: Hartnagel, 432.
- Pocomo formation, Mississippian, Pennsylvania: Munn, 782.
- Pohenagamuk formation, Ordovician, Quebec: Dresser, 288.
- Point Pleasant formation, Ordovician, Ohio: Fuller and Clapp, 346.
- Pokegama quartzite, pre-Cambrian, Minnesota: Van Barneveld, 1133.
- Ponca terrane, Cretaceous, Iowa: Keyes, 577.
- Pontiac group, pre-Cambrian, Quebec: Wilson, 1221.
- Pontiac schist, pre-Cambrian, Ontario and Quebec: Wilson, 1220.
- Porcupine group, Ordovician-Silurian, Alaska and Yukon: Cairnes, 150.
- Portage beds, Devonian, New York: Hartnagel, 432.
- Port Ewen beds, Devonian, New York: Hartnagel, 432.
- Port Jervis limestone, Devonian, New York: Hartnagel, 432.
- Porter shales, Miocene, Washington: Weaver, 1169.
- Porters Creek group, Tertiary, Missouri: Crane, 233.
- Potapaco clay member, Eocene, Maryland: Miller, 758.
- Potapaco clay member, Eocene, Virginia: Clark and Miller, 192.
- Potomac group, Cretaceous, Virginia: Berry, 67.
- Potosi dolomite, Alabama: Butts, 148.
- Potosi formation, Cambrian, Missouri: Crane, 233.
- Potsdam formation, Cambrian, Pennsylvania: Eaton, 303.
- Potsdam sandstone, Cambrian, New York: Hartnagel, 432.
- Potsdam sandstone, Ordovician, Quebec: Valiquette, 1132.
- Pottstown member, Triassic, Pennsylvania: Wherry, 1191.
- Pottsville formation, Carboniferous, Alabama: Munn, 786.
- Pottsville formation, Pennsylvanian, Illinois: Lines, 670.
- Pottsville formation, Pennsylvanian, Kentucky: Phalen, 850.
- Pottsville formation, Pennsylvanian, Pennsylvania: Munn, 782.
- Pottsville sandstone, Carboniferous, Illinois: Shaw, 970.
- Pottsville sandstone, Pennsylvanian, Illinois: Shaw and Savage, 972.
- Poughquag quartzite, Cambrian, New York: Hartnagel, 432.
- Poxino Island shale, Silurian, New York: Hartnagel, 432.
- Prairie du Chien group, Ordovician, Iowa: Norton *et al.*, 800.
- Prattsburg sandstone, Devonian, New York: Hartnagel, 432.
- Price sandstone, Mississippian, Virginia: Branson, 103.
- Prichard formation, pre-Cambrian: Hershey, 452.
- Prichard formation, pre-Cambrian, Idaho: Huston, 527.
- Proctor formation, Cambrian, Missouri: Crane, 233.
- Proctor sandstones, Carboniferous, West Virginia: Hennen, 447.
- Prosperity limestone member, Permian, Pennsylvania: Munn, 782.
- Protection formation, Cretaceous, British Columbia: Clapp, 183.
- Puerco formation, Tertiary, New Mexico: Lee, 648.
- Puerticitos limestone, Tertiary, Mexico: Lee, 650.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Puget formation, Eocene, Washington: Evans, 313; Weaver, 1169.
- Pulaski shale, Mississippian, Virginia: Branson, 103.
- Pulaski shale, Ordovician, New York: Hartnagel, 432.
- Punta de la Mesa sandstone member, Cretaceous, New Mexico: Lee, 648.
- Purcell series, Cambrian?, British Columbia: Schofield, 953.
- Purgatoire formation, Lower Cretaceous, Colorado: Stose, 1056.
- Purslane sandstone, Carboniferous, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Quadrant formation, Carboniferous, Montana: Calvert, 159.
- Quebec City formation, Ordovician, Ontario: Raymond, 888.
- Queenston, Silurian, New York: Hartnagel, 432.
- Queenstown shales, Ordovician, Ontario: Foerste, 329.
- Ralston formation, Eocene, Wyoming: Osborn, 815.
- Rapid terrane, Devonian, Iowa: Keyes, 577.
- Raquet series, Carboniferous, Alaska and Yukon: Cairnes, 150.
- Raritan formation, Cretaceous, New York: Hartnagel, 432.
- Ravenswood granodiorite, pre-Cambrian, New York: Hartnagel, 432.
- Rawhide formation, Carboniferous, British Columbia: LeRoy, 655.
- Redstone limestone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Reese formation, Tertiary, Montana: Calvert, 159.
- Rensselaer grit, Devonian, New York: Hartnagel, 432.
- Revett formation, pre-Cambrian, Idaho: Hershey, 452.
- Rex Chert member, Carboniferous, Idaho and Utah: Richards and Mansfield, 903.
- Rhinestreet shale, Devonian, New York: Hartnagel, 432.
- Richmond formation, Ordovician, Illinois: Lines, 670.
- Richmond formation, Ordovician, Ohio: Fuller and Clapp, 346.
- Ripley formation, Cretaceous, Illinois: Lines, 670.
- Riverside sandstone, Indiana: Cumings, 244.
- Riverside terrane, Tertiary, Iowa: Keyes, 577.
- Rochdale group, Cambrian, New York: Hartnagel, 432.
- Roche Miette limestone, Devonian, Alberta: Dowling, 285.
- Rochester shale, Silurian, New York: Hartnagel, 432.
- Rockcastle series, Carboniferous, Kentucky: Miller, 756.
- Rockmart shales and slates, Ordovician, Georgia: Maynard, 738.
- Rockport limestones, Carboniferous, West Virginia: Hennen, 447.
- Rockwell formation, Carboniferous, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Rockwood formation, Silurian, Tennessee: Maynard, 738.
- Rockwood formation, Silurian, Tennessee: Gordon and Jarvis, 383.
- Rogers Gap division, Ordovician, Kentucky: Foerste, 327.
- Rollins sandstone, Cretaceous, Colorado: Lee, 647.
- Rome formation, Cambrian, Georgia: Maynard, 738.
- Rome formation, Cambrian, Tennessee: Gordon and Jarvis, 383.
- Romney shale, Devonian, West Virginia and Maryland: Kindle, 581.
- Romney shale, Devonian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Rondout waterlime, Silurian, New York: Hartnagel, 432.
- Rosamond series: Tertiary, California: Baker, 39.
- Rosebud, Oligocene and Miocene, South Dakota: Osborn, 815.
- Rosebud formation, Tertiary, South Dakota: Perisho and Visher, 843.
- Rosendale waterlime, Silurian, New York: Hartnagel, 432.
- Roslyn formation, Eocene, Washington: Weaver, 1169.
- Ross Brook formation, Silurian, Nova Scotia: Williams, 1211.
- Rossland volcanic group, Carboniferous or post-Carboniferous, British Columbia: LeRoy, 656.
- Roubidoux formation, Cambrian, Missouri: Crane, 233.
- Royalton formation, Mississippian, Ohio: Prosser, 872.
- Rush Run sandstone, Carboniferous, West Virginia: Hennen, 447.
- Ruth limestone, Nevada: Hershey, 452.
- Rysedorph conglomerate, Ordovician, New York: Hartnagel, 432.
- Saanich granodiorite, British Columbia (Vancouver Island): Clapp, 182.
- Saanich granodiorite, Jurassic and Cretaceous?, British Columbia: Clapp and Allan, 185.
- Sabula terrane, Silurian, Iowa: Keyes, 577.
- Saclin formation, Quaternary, Nicaragua: Hershey, 450.
- Sagamore sandstone lentil, Devonian, Ohio: Prosser, 872.
- St. Charles limestone, Cambrian, Idaho and Utah: Richards and Mansfield, 903.
- St. Clair marble, Silurian, Oklahoma: Snider, 1005.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- St. Croixan or Upper Cambrian: Walcott, 1149.
- Ste. Genevieve formation, Mississippian, Missouri: Crane, 233.
- Ste. Genevieve limestone, Mississippian, Illinois: Lines, 670.
- St. Lawrence formation, Cambrian, Iowa: Norton *et al.*, 800.
- St. Lawrence terrane, Cambrian, Iowa: Keyes, 577.
- St. Louis group, Mississippian, Missouri: Crane, 233.
- St. Louis limestone, Mississippian, Illinois: Lines, 670.
- St. Louis terrane, Carboniferous, Iowa: Keyes, 577.
- St. Marys formation, Miocene, Maryland: Clark and Miller, 192.
- St. Marys formation, Miocene, North Carolina: Clark *et al.*, 193.
- St. Peter sandstone, Ordovician, Illinois: Lines, 670; Udden, 1117.
- St. Peter sandstone, Ordovician, Iowa: Norton *et al.*, 800.
- St. Peter sandstone, Ordovician, Missouri: Crane, 233.
- St. Peter sandstone, Ordovician, Ohio: Fuller and Clapp, 346.
- St. Peter terrane, Ordovician, Iowa: Keyes, 577.
- St. Piran formation, Cambrian, British Columbia: Allan, 9.
- St. Regis formation, pre-Cambrian, Idaho: Hershey, 452.
- Salamanca conglomerate, Mississippian, New York: Hartnagel, 432.
- Salem limestone, Carboniferous, Iowa: Van Tuyl, 1138.
- Salem limestone, Mississippian, Illinois: Lines, 670.
- Salem limestone, Mississippian, Iowa: Van Tuyl, 1136.
- Salina beds, Silurian, New York: Hartnagel, 432.
- Salina (?) formation, Silurian, Iowa: Norton *et al.*, 800.
- Salmon hornblende schist, Oregon and California: Hershey, 452.
- Saltsburgh sandstone, Carboniferous, West Virginia: Hennen, 447.
- San Fernando clays, Tertiary, Mexico: Dumble, 294.
- Sangamon stage, Quaternary, Indiana: Shannon, 966.
- Sangamon terrane, Quaternary, Iowa: Keyes, 577.
- San Juan epoch, Quaternary, Colorado: Atwood and Mather, 32.
- San Juan glacial epoch, Quaternary, Colorado: Atwood and Mather, 32.
- Sankaty formation, Quaternary, New York: Hartnagel, 432.
- San Miguel limestone, Tertiary?, Costa Rica: Romanes, 931.
- San Pablo series, Neocene, California: Clark, 188.
- Santa Margarita division, Miocene, California: Dumble, 293.
- Saranac gneiss, pre-Cambrian, New York: Hartnagel, 432.
- Saratogan group, Cambrian, New York: Hartnagel, 432.
- Saverton shales, Carboniferous, Iowa, Missouri: Keyes, 578.
- Saverton terrane, Carboniferous, Iowa: Keyes, 577.
- Schaghticoke shale, Ordovician, New York: Hartnagel, 432.
- Schneectady beds, Ordovician, New York: Hartnagel, 432.
- Schoharie grit, Devonian, New York: Hartnagel, 432; Kindle, 581.
- Seine series, pre-Cambrian, Ontario: Lawson, 636, 637.
- Selinsgrove limestone and shale, Devonian, Pennsylvania: Kindle, 581.
- Selkirk series, pre-Cambrian and Cambrian, British Columbia: Daly, 254.
- Senecan group, Devonian, New York: Hartnagel, 432.
- Sergeant terrane, Cretaceous, Iowa: Keyes, 577.
- Sevier shales, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Sewickley limestone, Carboniferous, West Virginia: Hennen, 447.
- Sewickley sandstone (upper), Carboniferous, West Virginia: Hennen, 447.
- Sewickley sandstone (lower), Carboniferous, West Virginia: Hennen, 447.
- Sewickley sandstone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Shakopee terrane, Cambrian, Iowa: Keyes, 577.
- Shannon sandstone, Cretaceous, Wyoming: Jamison, 540.
- Sharon conglomerate, Mississippian, Ohio: Prosser, 872.
- Sharon conglomerate member, Pennsylvanian, Kentucky: Phalen, 850.
- Sharon shale, Pennsylvanian, New York: Hartnagel, 432.
- Sharpville sandstone, Mississippian, Ohio: Prosser, 872.
- Shawangunk conglomerate, Silurian, New York: Hartnagel, 432.
- Shawangunk formation, Silurian, Pennsylvania: Miller, 757.
- Shawangunk grit, Silurian, Pennsylvania: Peck, 839.
- Shawnee formation, Pennsylvanian, Missouri: Hinds, 470.
- Shegundah beds, Ordovician, Ontario: Foerste, 329.
- Shelby (upper) dolomite, Silurian, New York: Hartnagel, 432.
- Shelby (lower) dolomite, Silurian, New York: Hartnagel, 432.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Shenango sandstone, Mississippian, Pennsylvania: Prosser, 872.
- Sherbrooke formation, British Columbia: Burling, 135.
- Sherbrooke formation, Cambrian, British Columbia: Allan, 9.
- Sherburne flags, Devonian, New York: Hartnagel, 432.
- Short Creek oolite member, Mississippian, Oklahoma: Snider, 1005.
- Shumla sandstone, Devonian, New York: Hartnagel, 432.
- Shuswap series, pre-Cambrian, British Columbia: Daly, 254, 255.
- Sicamous limestone, pre-Cambrian, British Columbia: Daly, 254.
- Sicker series, Jurassic or Triassic, British Columbia (Vancouver Island): Clapp, 182; Clapp and Allan, 185.
- Sillery formation, Cambrian, Quebec: Dresser, 288.
- Sioux quartzite, Algonkian, Iowa: Norton *et al.*, 800.
- Siwash series, British Columbia: Bateman, 57.
- Siwash series, Carboniferous, British Columbia: Camsell, 162.
- Skaneateles shale, Devonian, New York: Hartnagel, 432.
- Skeena series, Lower Cretaceous, British Columbia: Malloch, 715.
- Skunnemunk conglomerate, Devonian, New York: Hartnagel, 432.
- Smithwick shale, Pennsylvanian, Texas: Paige, 817.
- Snake Hill beds, Ordovician, New York: Clarke, 198; Hartnagel, 432.
- Snyder shales, Carboniferous, Iowa, Missouri: Keyes, 578.
- Sodus shale, Silurian, New York: Hartnagel, 432.
- Solon terrane, Devonian, Iowa: Keyes, 577.
- Sooke formation, Oligocene-Miocene, British Columbia: Clapp and Allan, 185.
- Sooke formation, Tertiary, British Columbia (Vancouver Island): Clapp, 182.
- Sooke gabbro, British Columbia (Vancouver Island): Clapp, 182.
- Sooke gabbro group, Jurassic and Cretaceous?, British Columbia: Clapp and Allan, 185.
- Soulala formation, Quaternary, Nicaragua: Hershey, 450.
- Spearfish formation, Triassic?, Wyoming-South Dakota: Stone, 1045.
- Spergen formation, Mississippian, Missouri: Crane, 233.
- Spergen terrane, Carboniferous, Iowa: Keyes, 577.
- Stafford limestone, Devonian, New York: Hartnagel, 432.
- Standish flags and shales, Devonian, New York: Hartnagel, 432.
- Stanton terrane, Cretaceous, Iowa: Keyes, 577.
- State Quarry limestone, Devonian, Iowa: Norton *et al.*, 800.
- Steeprock series, pre-Cambrian, Ontario: Lawson, 636, 637.
- Stephen formation, Cambrian, British Columbia: Allan, 9; Walcott, 1152.
- Stissing limestone, Cambrian, New York: Hartnagel, 432.
- Stockbridge limestone, Taconic Mountains: Keith, 568.
- Stockton beds, Juratrias, New York: Hartnagel, 432.
- Stockton formation, Triassic, New Jersey: Wherry, 1191.
- Stonehouse formation, Silurian, Nova Scotia: Williams, 1211.
- Storm King granite, pre-Cambrian, New York: Hartnagel, 432.
- Stormville sandstone, Devonian, New York: Hartnagel, 432.
- Striped Peak formation, pre-Cambrian, Idaho: Hershey, 452.
- Sulphur Springs formation, Devonian, Missouri: Crane, 233.
- Sunbury shale, Carboniferous, Ohio: Prosser, 871.
- Sunbury shale, Mississippian, Ohio: Hyde, 528; Prosser, 872; Stauffer, 1025.
- Sunbury shale, Waverlyan, Ohio: Ulrich, 1122.
- Sundance formation, Jurassic, Wyoming: Jamison, 539, 540; Wegemann, 1178.
- Sundance formation, Jurassic, Wyoming-South Dakota: Stone, 1045.
- Sunderland formation, Pleistocene, North Carolina: Clark *et al.*, 193.
- Sunderland formation, Pleistocene, Virginia: Clark and Miller, 192.
- Sunset division, Ordovician, Ohio and Kentucky: Foerste, 327, 328.
- Sutton formation, Jurassic, British Columbia (Vancouver Island): Clapp, 182.
- Sutton formation, Jurassic or Triassic, British Columbia: Clapp and Allan, 185.
- Sutton Mountain series, pre-Cambrian, Quebec: Harvie, 433.
- Sweetland Creek shale, Devonian, Iowa: Norton *et al.*, 800.
- Sweetland Creek shale, Iowa and Illinois: Udden, 1118.
- Sweetland shale, Carboniferous, Missouri: Keyes, 578.
- Swift Current beds, Ordovician, Ontario: Foerste, 329.
- Sylamore sandstone member, Devonian, Oklahoma: Snider, 1005.
- Syracuse salt, Silurian, New York: Hartnagel, 432.
- Taconic system, Hartnagel, 432.
- Talbot formation, Pleistocene, Maryland: Miller, 758.
- Talbot formation, Pleistocene, Virginia: Clark and Miller, 192.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Talon formation, Devonian?, Quebec: Dresser, 288.
- Tantalus conglomerates, Jura-Cretaceous: Cairnes, 149.
- Tate division, Ordovician, Kentucky: Foerste, 327.
- Tate member, Ordovician, Kentucky: Foerste, 327.
- Tatman formation, Tertiary, Wyoming: Sinclair and Granger, 985.
- Taylor sandstone, Carboniferous, West Virginia: Hennen, 447.
- Tejon formation, Eocene, California: Anderson, 15; Dumble, 293.
- Tejon formation, Eocene, Washington: Weaver, 1169.
- Tellico formation, Ordovician, Tennessee: Gordon and Jarvis, 383.
- Temiskaming series, lower Huronian, Ontario: McMillan, 709.
- Temiskaming series, pre-Cambrian, Ontario: Burrows, 137; Hopkins, 491.
- Tetagouche series, Ordovician, New Brunswick: Young, 1258.
- Thayer terrane, Cretaceous, Iowa: Keyes, 577.
- Thaynes formation, Triassic, Utah: Boutwell, 92.
- Thaynes limestone, Triassic, Idaho and Utah: Richards and Mansfield, 903.
- "Thebes sandstone and shale," Ordovician, Illinois: Lines, 670.
- Theresa dolomite, Cambrian, New York: Hartnagel, 432.
- Thompson River silts, Pleistocene, British Columbia: Daly, 254.
- Threeforks shale, Devonian, Montana: Calvert, 159.
- Tichenor limestone, Devonian, New York: Hartnagel, 432.
- Timpas limestone, Upper Cretaceous, Colorado: Stose, 1056.
- Tonoloway limestone, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Totatlanika schist, Silurian or Devonian?, Alaska: Capps, 170.
- Tradewater formation, Pennsylvanian, Kentucky: Glenn, 373.
- Travis Peak formation, Cretaceous, Texas: Paige, 817.
- Trent formation, Eocene, North Carolina: Clark *et al.*, 193.
- Trenton, Ordovician, Vermont: Perkins, 845.
- Trenton beds, Ordovician, New York: Hartnagel, 432.
- Trenton formation, Ordovician, Ontario: Raymond, 888.
- Trenton group, Ordovician, Quebec: Valiquette, 1132.
- Trenton limestone, Ordovician, Pennsylvania: Ziegler, 1262.
- "Trenton-Galena" limestone, Ordovician, Illinois: Lines, 670.
- Trent River shales, British Columbia: Clapp, 184.
- Tres Hermanos sandstone member, Cretaceous, New Mexico: Lee, 648.
- Tribes Hill limestone, Ordovician, New York: Hartnagel, 432.
- Tribune formation, Mississippian, Illinois: Lines, 670.
- Tribune formation, Mississippian, Missouri: Crane, 233.
- Tribune limestone, Carboniferous, Illinois: Shaw, 970.
- Trinity formation, Cretaceous, Texas: Paige, 817.
- Tully limestone, Devonian, New York: Hartnagel, 432.
- Turgeon formation, Silurian, New Brunswick: Young, 1258.
- Tuscarora sandstone, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Tuxedni sandstone, Jurassic, Alaska: Martin and Katz, 721.
- Tuxpam beds, Miocene, Mexico: Dumble, 294.
- Twin Creek limestone, Jurassic, Idaho and Utah: Richards and Mansfield, 903.
- Tyner formation, Ordovician, Oklahoma: Snider, 1005.
- Uinta epoch, Quaternary, Colorado: Atwood and Mather, 32.
- Uinta formation, Eocene, Wyoming: Osborn, 815.
- Uinta (?) formation, Tertiary, Utah: Lup-ton, 689, 690.
- Uinta formation, Tertiary, Utah: Riggs, 917.
- Uinta glacial epoch, Quaternary, Colorado: Atwood and Mather, 32.
- Ulsterian group, Devonian, New York: Hartnagel, 432.
- Unadilla terrane, Devonian, New York: Hartnagel, 432.
- Uncas shale, Permian, Oklahoma: Ohern and Garrett, 803.
- Uncompahgre interglacial interval, Quaternary, Colorado: Atwood and Mather, 32.
- Union formation, Pliocene, Kentucky: Glenn, 373.
- Union Hill diabase, Jura-Trias, New York: Hartnagel, 432.
- Uniontown limestone, Carboniferous, West Virginia: Hennen, 447.
- Uniontown limestone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Uniontown sandstone, Carboniferous, West Virginia: Hennen, 447.
- Uniontown sandstone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Ute limestone, Cambrian, Idaho and Utah: Richards and Mansfield, 903.
- Utica, Ordovician, Vermont: Perkins, 845.
- Utica formation, Ordovician, Ontario: Raymond, 888.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- Utica shale, Ordovician, New York: Hartnagel, 432.
- Utica shale, Ordovician, Ohio: Fuller and Clapp, 346.
- Utica shale, Ordovician, Pennsylvania: Ziegler, 1262.
- Utica shale, Ordovician, Quebec: Valiquette, 1132.
- Valcour limestone, Ordovician, New York: Hartnagel, 432.
- Vancouver group, Jurassic and Triassic, British Columbia: Clapp, 183.
- Vancouver group, Mesozoic, British Columbia: Clapp and Allan, 185.
- Vancouver group, Triassic and Jurassic, British Columbia (Vancouver Island): Clapp, 182.
- Vancouver volcanics, Jurassic, British Columbia (Vancouver Island): Clapp, 182.
- Vancouver volcanics, Jurassic and other?, British Columbia: Clapp and Allan, 185.
- Vanport limestone member, Pennsylvanian, West Virginia, Kentucky: Phalen, 850.
- Vaqueros division, Miocene, California: Dumble, 293.
- Vera Cruz graphite schist, Algonkian, Pennsylvania: Miller, 757.
- Vergennes sandstone member, Pennsylvanian, Illinois: Shaw and Savage, 972.
- Vernon shale, Silurian, New York: Hartnagel, 432.
- Vinton member, Mississippian, Ohio: Hyde, 528.
- Virginia slate, pre-Cambrian, Minnesota: Van Barneveld, 1133.
- Wabash beds, Quaternary, Indiana: Hay, 437.
- Wabaunsee formation, Pennsylvanian, Missouri: Hinds, 470.
- Waccamaw formation, Pliocene, North Carolina: Clark, *et al.*, 193.
- Wahkiakum formation, Miocene, Washington: Weaver, 1169.
- Waits River limestone, Ordovician, Vermont: Richardson, 904; Richardson and Collister, 905; Richardson and Conway, 906.
- Walden sandstone, Pennsylvanian, Georgia: Maynard, 738.
- Wallace formation, pre-Cambrian, Idaho: Hershey, 452.
- Wall Creek sandstone, Cretaceous, Wyoming: Jamison, 540.
- Wall Creek sandstone lentil, Cretaceous, Wyoming, Wegemann, 1178.
- Walnut clay, Cretaceous, Texas: Paige, 817.
- Wamsutta red beds, Rhode Island: Barrell, 48.
- Wapsipinicon limestone, Devonian, Iowa: Norton *et al.*, 800.
- Wardner limestone, Mississippian, British Columbia: Schofield, 953.
- Wark diorite, British Columbia (Vancouver Island): Clapp, 182.
- Wark gneiss, Jurassic and Cretaceous?, British Columbia: Clapp and Allan, 185.
- Warsaw formation, Mississippian, Illinois: Lines, 670.
- Warsaw formation, Mississippian, Missouri: Crane, 233.
- Warsaw terrane, Carboniferous, Iowa: Keyes, 577.
- Wasatch formation, Eocene, Colorado: Lee, 647.
- Wasatch formation, Tertiary, Colorado: Lee, 648.
- Wasatch formation, Tertiary, Wyoming: Jamison, 539.
- Wasatch formation, Tertiary, Utah: Lupton, 689, 690.
- Wasatch series, Eocene, Wyoming: Osborn, 815.
- Washakie formation, Eocene, Wyoming: Osborn, 815.
- Washburn beds, pre-Cambrian, Wisconsin: Thwaites, 1085.
- Washington fire clay shale, Carboniferous, West Virginia: Hennen, 447.
- Washington formation, Permian, Pennsylvania: Munn, 782.
- Washington limestone (upper), Carboniferous, West Virginia: Hennen, 447.
- Washington (lower) limestone member, Permian, Pennsylvania: Munn, 782.
- Washington (middle) limestone member, Permian, Pennsylvania: Munn, 782.
- Washington (upper) limestone member, Permian, Pennsylvania: Munn, 782.
- Watertown limestone, Ordovician, New York: Hartnagel, 432.
- Waucoban or Lower Cambrian: Walcott, 1149.
- Waynesburg limestone member, Pennsylvanian, Pennsylvania: Munn, 782.
- Waynesburg sandstone, Carboniferous, West Virginia: Hennen, 447.
- Waynesburg sandstone member, Permian, Pennsylvania: Munn, 782.
- Weber grits, Carboniferous, Colorado: Patton *et al.*, 834.
- Weber quartzite, Carboniferous, Utah: Boutwell, 92.
- Weber shales, Carboniferous, Colorado: Patton *et al.*, 834.
- Wedington sandstone member, Mississippian, Oklahoma: Snider, 1005.
- Weisner quartzite, Cambrian, Georgia: Maynard, 738.
- Wekwemikongsing beds, Ordovician, Ontario: Foerste, 329.
- Wells formation, Pennsylvanian, Idaho and Utah: Richards and Mansfield, 903.
- Wellsburg sandstone, Devonian, New York: Hartnagel, 432.
- West Hill flags and shale, Devonian, New York: Hartnagel, 432.

GEOLOGIC FORMATIONS DESCRIBED—Continued.

- West Index andesitic series, Tertiary?, Washington: Weaver, 1168.
- West River shale, Devonian, New York: Hartnagel, 432.
- Wheaton River volcanics, Tertiary or Pleistocene, Yukon: Cairnes, 149.
- Whirlpool, Silurian, New York: Hartnagel, 432.
- White Pine formation, Nevada: Hershey, 452.
- White River formation, Oligocene, Wyoming: Winchester, 1231.
- White River formation, Tertiary, South Dakota: Perisho and Visser, 843.
- White River formation, Tertiary, Wyoming: Jamison, 539.
- White River group, Oligocene, South Dakota: Osborn, 815.
- Whiterock quartzite, Cambrian or pre-Cambrian, Nova Scotia: Faribault, 318.
- Wichita formation, Texas: Udden, 1119; Udden and Phillips, 1121.
- Wicomico formation, Pleistocene, Maryland: Miller, 758.
- Wicomico formation, Pleistocene, Virginia: Clark and Miller, 192.
- Wicomico formation, Pleistocene, North Carolina: Clark *et al.*, 193.
- Wilberns formation, Cambrian, Texas: Paige, 817.
- Wilbur limestone, Silurian, New York: Hartnagel, 432.
- Williamson shale, Silurian, New York: Hartnagel, 432.
- Wills Creek shale, Silurian, West Virginia, Pennsylvania, Maryland: Stose and Swartz, 1058.
- Wilson formation, Carboniferous, Oklahoma: Ohern and Garrett, 803.
- Wind River formation, Tertiary, Wyoming: Woodruff and Winchester, 1246.
- Wind River series, Eocene, Wyoming: Osborn, 815.
- Windsor series, Mississippian, New Brunswick: Bell, 65.
- Windy Gap limestone, Carboniferous, West Virginia: Hennen, 447.
- Winfield limestone, Permian, Oklahoma: Ohern and Garrett, 803.
- Winnipeg limestone, Ordovician, Ontario: Lawson, 637.
- Wisconsin drift, Quaternary, Illinois: Udden, 1117.
- Wisconsin stage, Quaternary, Indiana: Shannon, 966.
- Wisconsin terrane, Quaternary, Iowa: Keyes, 577.
- Wiscoy shale and sands, Devonian, New York: Hartnagel, 432.
- Wolcott limestone, Silurian, New York: Hartnagel, 432.
- Wolf Creek conglomerate, Mississippian, New York: Hartnagel, 432.
- Woodbury terrane, Cretaceous, Iowa: Keyes, 577.
- Woodside shale, Triassic, Idaho and Utah: Richards and Mansfield, 903.
- Woodside shale, Triassic, Utah: Boutwell, 92.
- Woodstock greensand marl member, Eocene, Virginia: Clark and Miller, 192.
- Woodstock marl member, Eocene, Maryland: Miller, 758.
- Worcester phyllite, Carboniferous, Massachusetts: White, 1194.
- Worcester quartzite, Carboniferous, Massachusetts: White, 1194.
- Wreford limestone, Permian, Oklahoma: Ohern and Garrett, 803.
- Yarmouth terrane, Quaternary, Iowa: Keyes, 577.
- Yonkers gneiss, pre-Cambrian, New York: Hartnagel, 432.
- Yorktown formation, Miocene, North Carolina: Clark *et al.*, 193.
- Yorktown formation, Miocene, Virginia: Clark and Miller, 192.
- Yule limestone, Ordovician, Colorado: Patton *et al.*, 834.



